

Fellowship Overview, Structure, Goals and Learning Objectives

Fellowship Overview

Structure and Curriculum

Pediatric Anesthesia Faculty

Teaching Methodology

Evaluation and Assessment Methods

Goals and Learning Objectives (Based on the Six ACGME Core Competencies)

A downloadable version can be accessed at any time on the Division website www.maskinduction.com. Fellows are required to review these Goals and Learning Objectives prior to beginning their training. Any questions pertinent to these guidelines should be discussed with the Fellowship Program Director.

I. Fellowship Overview

The Department of Anesthesiology and Perioperative Medicine at Tufts Medical Center offers one-year clinical fellowship training in Pediatric Anesthesia. The fellowship is accredited by the Accreditation Council for Graduate Medical Education (ACGME) and provides comprehensive training in providing anesthesia care for neonates, infants and children.

The Division of Pediatric Anesthesia was founded in the mid 1950's by Dr. Robert. N. Reynolds, a very distinguished physician and teacher. Working with interdisciplinary specialists throughout

the hospital, members of our department play an active role within the Medical Center and the integrated Floating Hospital for Children.

Each year 2 candidates are accepted into our Pediatric Anesthesiology Fellowship Program at Tufts Medical Center and the Floating Hospital for Children. Our fellowship program offers superb training opportunity in all aspects of pediatric anesthesiology. Our case volume, breadth of clinical material and excellence of our faculty provide a remarkable fellowship experience. You will find our institution to be warm, friendly and state-of-the-art, with a faculty dedicated to excellence in patient care and education.

The majority of the clinical training is conducted at Tufts Medical Center and Floating Hospital for Children. However, you will spend two months at the Children's Hospital in Boston for specific training in Pediatric Pain Management and Pediatric Cardiac Anesthesia.

Broadly the fellowship aims to accomplish the followings goals:

1. Provide fellows with a broad clinical experience in pediatric anesthesia fostering proficiency in providing excellent care to neonates, infants, children, and adolescents undergoing a wide variety of surgical, diagnostic, and therapeutic procedures.
2. Technical skills in pediatric airway management and pediatric invasive monitoring.
3. A comprehensive understanding of the developmental, pharmacological, anatomic, physiologic, and psychological changes that occur with age and disease.
4. An understanding of pediatric pain and its management.
5. Experience caring for patients with complex congenital heart disease.
6. Experience in care of neonates, infants and children in Neonatal and Pediatric Intensive Care Units.
7. Understanding of critical perioperative care and advanced life support; and finally
8. Competence as a perioperative pediatric anesthesiologist and consultant.

Over the years we have developed a sound curriculum to help you achieve these goals. Details of our curriculum as well as the goals and objectives based on the six core competencies are discussed and detailed below.

Research, though an important part of a subspecialty year, is not a requirement of the Program.

II. Structure and Didactic Curriculum

The pediatric anesthesiology fellowship involves advanced clinical training in all aspects of anesthesia and perioperative pediatric medicine. Exposure is provided in anesthetic management of a variety of pediatric surgical specialties

The fellowship consists of

- Clinical care activities for pediatric patients in the operating room, off-site locations, inpatient hospital units and critical care units
- A formal didactic curriculum presented in lectures and conferences

A. Clinical Activities

Clinical activities during the year are broadly divided into the following rotations.

General and Cardiac Pediatric Operating Room at Tufts Medical Center and Floating Hospital for Children. (includes offsites like MRI, EP, Pediatric Cath, CT etc.)	8 Months
Pediatric Cardiac Anesthesia <i>(offsite rotation at Children’s Hospital Boston)</i>	2 Months
Pediatric Pain Management <i>(offsite rotation at Children’s Hospital Boston)</i>	2 weeks
Pediatric Regional Anesthesia <i>(offsite rotation at Children’s Hospital Boston)</i>	2 weeks
NICU/ PICU	1 Month (2weeks each)
Anesthesia for Pediatric Burn Patients <i>(offsite rotation at Shriners Hospital for Children)</i> THIS ROTATION IS NO LONGER AVAILABLE	2 weeks
Vacation + Personal Days / CME	20 / 5 working days

Time spent in the OR aims to provide our fellows with adequate exposure in a wide array of pediatric subspecialty cases including:

- Pediatric General Surgery

- Pediatric Cardiothoracic Surgery (one month at CHB Plus 20-30 additional OR and Pedi Cath Lab cases at Tufts spread throughout the year)
- Pediatric Neurosurgery
- Pediatric Orthopedics
- Pediatric Otolaryngology
- Pediatric Ophthalmology
- Pediatric Plastic Surgery including Craniofacial Surgery
- Pediatric Urology
- Pediatric Transplant Surgery
- Pediatric Oral/Dental Surgery
- Pediatric Gastroenterology
- Pediatric Burn Surgery
- Pediatric Radiological Procedures

B. Formal Didactic Program

A formal didactic program is extremely essential and complements traditional OR teaching.

1. Core Didactic Lecture Series

Core Lectures and Journal Clubs form the backbone of our didactic program. Topics vital and relevant to pediatric anesthesia are presented every Monday between 3-5pm by Pediatric Anesthesia Faculty. The Lectures are held in the Small Conference Room on Ziskind 6 within the department premises. The lecture schedule is emailed to faculty and fellows and also posted on the division website www.maskinduction.com.

Lecture Topics are based on the broad categories listed below:

a) *Basic Principles:*

1. Pharmacology of Intravenous Anesthetics in Children
2. Pharmacology of Inhaled Anesthetics in Children
3. Changing Cardiac and Respiratory Physiology of the Pediatric Patient and Its Importance to the Pediatric Anesthesiologist
4. Anesthetic Equipment for Infants and Children Part 1: Circuits
5. Anesthetic Equipment for Infants and Children Part 2: Cuffed vs. Uncuffed Endotracheal Tubes
6. Preoperative Assessment of Neonates and Children

7. Pediatric Induction and Maintenance Techniques
8. Pediatric Airway Management
9. Laryngospasm
10. Thermal Regulation
11. Epidural and Spinal Anesthesia / Analgesia in infants and Children
12. Pediatric and Neonatal Advanced Life Support
13. Arterial Blood Gas Interpretation
14. Blood Transfusion Principles in Pediatrics
15. Fluid and Electrolyte management in Neonates, Infants and Children
16. Malignant Hyperthermia
17. Pediatric Pain Management

b) Anesthetic Management of Patients with Special Surgical and Medical Conditions:

1. Management of the Patient with Congenital Diaphragmatic Hernia
2. Management of the Patient with TEF and other Common Surgical Disease Requiring Thoracotomy
3. Anesthesia for Patients having Spine Surgery
4. Anesthesia for Patients having Tonsillectomy and Adenoidectomy
5. Anesthesia for Patients having Cleft Lip and Palate Repair
6. Perioperative Management in Acute Pediatric Trauma
7. Anesthesia for the Patient with Pyloric Stenosis
8. Anesthesia for Children with Airway and Esophageal Foreign Bodies, and Bleeding Tonsils
9. Management of Common Neonatal Emergencies
10. The Extremely Premature Infant (Micropremie)
11. Pediatric Neurosurgical Anesthesia
12. Anesthesia for Children with Burns
13. Anesthetic Management of patients with Congenital Heart Disease
14. Perioperative Management of Common Pediatric Syndromes and Sequences
15. Anesthetic Management of Children with Cerebral Palsy
16. Anesthetic Management of Children with Mitochondrial Disease
17. Perioperative Care of Patients with Hemoglobinopathies

c) Miscellaneous Topics:

1. Offsite Pediatric Anesthesia. MRI, CT, Nuclear Med, Radiation Oncology etc.
2. Transport of the Critically Ill

3. Ethics
4. Child Life

2. Journal Club

Subspecialty fellows should be instructed in the conduct of scholarly activities and the evaluation of investigative methods and interpretation of data, including statistics. They should have the opportunity to develop competence in critical assessment of new therapies and the medical literature. Journal Club allows the fellow to learn to use available tools and resources to evaluate scholarly works by critically evaluating investigative methods, data interpretation and statistical analysis.

Journal Clubs are held once in 6 weeks.

3. Department Grand Rounds:

Formal Department of Anesthesiology Grand Rounds are held every Thursday morning between 7-8 AM. Speakers are invited from both within and outside the hospital. Topics presented encompass a whole range of subjects including subspecialty topics. Attendance is mandatory.

4. Department M and M Conference

Morbidity and Mortality conferences are presented once a month as part of the Department Grand Rounds. This educational conference represents a forum in which unanticipated perioperative events are discussed in an open, yet, confidential forum. Attendance by all trainees (Fellows, Residents, and SRNA's) is MANDATORY. Fellows are excused when their rotations make them unavailable to attend. The format consists of a case presentation by a trainee, followed by a faculty or fellow facilitated discussion. Case presentation preparation should include a thorough review of the OR anesthetic and post-anesthesia care records as well as important postoperative events. In addition, a current and appropriate literature review is expected.

5. Formal Fellow Pediatric Anesthesia Grand Rounds

Fellows will be required to present one formal lecture to the Department of Anesthesiology. These lectures will be presented in the Ziskind 6 Large Anesthesia Conference Room. The fellows will be notified of the dates and time and will have at least two months to prepare their presentation.

6. Lectures at Children's Hospital

Fellows will attend Lectures, Conferences and Grand Rounds during their 2 months stay at the Children's Hospital in Boston.

7. Interdepartmental and Hospital Wide Conferences

Fellows are strongly encouraged to attend Interdisciplinary Conferences and Grand Rounds organized by the NICU, PICU, Kiwanis Trauma Center and the Department of Pediatrics. Department of Newborn Medicine holds their interdisciplinary meeting every Thursday at 1PM.

8. Seminars and Lectures at the TUSM, Sackler Graduate School of Biomedical Sciences, and Tufts CTSI

C. Research Expectations for Fellows

Research, though an important aspect of learning is not a requirement of our clinical fellowship program. The fellow is encouraged to write case reports, prepare scientific posters and also contribute to the design, data collection and analysis of new and ongoing research projects within the department.

D. Academic Time (Non-Clinical Time)

We endeavor to assign our fellows two Non-Clinical Academic days per month. We intend to have these days listed on the master department schedule so that the fellow can plan the day well in advance and use it productively. The fellows are supposed to be in-house on their non-clinical day since they may be called upon to help in the Operating Room under extraneous circumstances.

Two protected academic days is standard practice in most academic pediatric anesthesia fellowship programs in the country.

Additional time may be granted by the Fellowship Director if the fellow gets involved in a major research project.

No academic time is guaranteed during offsite rotations at the Children's Hospital, in the NICU and PICU. The fellows will follow time off policy set forth by the facility / department.

III. Faculty

A. Tufts Medical Center and the Floating Hospital for Children: Pediatric Anesthesia Core Faculty

Aman Kalra, MD	Chief of Pediatric Anesthesia Director, Pediatric Anesthesia Fellowship Program Clinical Associate Professor of Anesthesiology, Tufts University School of Medicine
David Moss, MD	Pediatric Anesthesiologist Assistant Professor, Tufts University School of Medicine
Tom Sung, MD	Pediatric Anesthesiologist Assistant Professor, Tufts University School of Medicine
Henna Tirmizi, MD	Pediatric Cardiac Anesthesiologist Assistant Professor, Tufts University School of Medicine
Victoria Vo, MD	Pediatric Anesthesiologist Assistant Professor, Tufts University School of Medicine
Monique Marin Santoni, MD	Pediatric and Adult Anesthesiologist Assistant Professor, Tufts University School of Medicine
Sean Gallagher, MD	Pediatric Anesthesiologist / Pediatric Cardiac Anesthesiologist. Assistant Professor, Tufts University School of Medicine
Ghofran Habib, MD	Pediatric and Adult Anesthesiologist
Tommy Burch, MD	Pediatric and Adult Cardiac Anesthesiologist

Complete updated faculty listing can be accessed online at
<http://www.tuftsmedicalcenter.org/OurServices/Anesthesiology/>

IV. Teaching Methodology

The ACGME has recognized six general competencies for graduate medical education. These competencies are:

1. Medical Knowledge (MK)
2. Patient Care (PC)
3. Interpersonal and Communication Skills (ICS)
4. Professionalism (PROF)
5. Practice Based Learning and Improvement (PBLI)
6. Systems Based Practice (SBP)

Competency based education focuses on learner performance (learning outcomes) in reaching specific objectives (goals and objectives of the curriculum).

The defined Goals and Objectives of our fellowship program will be met utilizing the following methods:

1. Didactic Activities: Core Lecture Series, Monday Grand rounds, Morbidity and Mortality Conferences and Monthly Journal Clubs.
2. Clinical Teaching in the OR.
3. Close supervision by faculty allowing for continuous discussion of patient care issues and the rational underlying decision-making in the clinical setting.
4. Clinical Assignments and fellow presentations
5. PBLI and SBP Activities: (involvement in QA/QI, M&M conferences, Risk Management and Patient Safety Initiatives)
6. Guided personal study
7. Clinical Research Projects
8. Simulation Education

Recommended Texts, Reading Material and Electronic Resources:

- *“A Practice of Anesthesia for Infants and Children”* by Charles J. Cote, David Todres has been recently updated. Sixth Edition 2018 is available in both print and online format.
- *“Smith’s Anesthesia for Infants and Children”* by Davis, Cladis and Motoyama. 9th Edition 2016. This book has also been thoroughly updated and is available in both print and online formats
- *“A Practical Approach to Pediatric Anesthesia”* by Robert Holzman and Thomas Mancuso is a very readable text that is recommended for our residents and fellows.

- “*Clinical Anesthesia Procedures of the Massachusetts General Hospital*” by Peter Dunn and Keith Baker. The Pediatric Anesthesia and Neonatal Section give a good outline and is an easy read.
- Electronic Access via Tufts Health Sciences Library to multiple reference and research resources (OVID, Medline, MD Consult, Pediatric Anesthesia Journals etc.)
- Pediatric Anesthesia Sections from Major Anesthesia Texts (Miller, Barash etc.)
- Pediatric Anesthesia Division Digital Handbook: www.maskinduction.com. Resource – Dr Aman Kalra
- “Ever note” based learning modules. Resource – Dr David Moss

V. Evaluation and Assessment Methods

Your clinical performance during the fellowship will be assessed using a collection of assessment and evaluation tools to assure that the competency set goals and objectives are being met. Constructive assessment and feedback will help you focus on areas and skill sets which need attention and further improvement. Assessment data will also help us improve our fellowship and improve your educational experience. Competencies covered using each method are delineated in *italics* below

A. Focused Direct Observation and Feedback

Fellows will receive direct observation and feedback from supervising faculty. This will include verbal feedback on a daily basis and formal clinical performance rating utilizing the New Innovations Resident Evaluation System. You will have access to your evaluations after the fellowship director has reviewed and certified the evals by other faculty. The Fellowship Director will provide you with formal summative evaluations in a one to one meeting every 3-4 months (twice in the year at the minimum) or as and when required. **As of 2015, Fellows are also being evaluated using the newly introduced ACGME’s Milestones Evaluation System. Milestones are required to be submitted to the ACGME every six months.**

All 6 competencies.

B. 360 ° Global Evaluations

These are evaluations by different members of the patient care team (Surgeons, Nursing Staff, and Ancillary Staff etc.) which help provide multiple perspectives of the fellow’s performance.

Professionalism, Interpersonal and Communication Skills, SBP.

C. Review of Case Logs

You are expected to log in your cases in a timely fashion. Our Program Coordinator will set-up your account on the [ACGME website](#). Case logs will be reviewed periodically by the Fellowship Director to assess compliance. If deficiencies are found in certain skill sets or case types, the Fellowship Director will coordinate with the OR Clinical Coordinators to get you assigned to such cases.

Medical Knowledge.

Patient Care.

D. Participation in Didactic and Educational Activities

Core Lectures, Participation in Case Conferences and M&Ms. Each fellow will present at least 1 formal Grand Rounds/M&M presentation during their academic year

PBLI.

Interpersonal and Communication Skills.

Medical Knowledge.

Patient Care.

E. Mock Orals and Oral Board Review

Semi Annual Mock Orals are conducted by the department to prepare residents and fellows for the ABA Oral Exams. The Mock Orals also gives us the opportunity to assess your professional analytical and communication skills.

Medical Knowledge.

Interpersonal and Communication Skills.

PBLI.

SBP.

F. Scholarly Activity and Research

Fellows are strongly encouraged to participate in scholarly activities, ongoing research projects, write case reports and participate in national meetings. They are expected to present their academic projects at local, regional or national meetings at least once during their fellowship.

Medical Knowledge

Interpersonal and Communication Skills.

Practice Based Learning and Improvement.

G. Program Evaluation by Fellows

Two formal mechanisms are used to evaluate the program.

1. ACGME Resident/ Fellow Survey. Results of this survey are not available to program with fewer than 4 trainees. Accumulative results are made available to the program every 3-4 years.

2. At the end of the academic year, pediatric anesthesia fellows are required to evaluate the fellowship program via the New Innovations platform. Program evaluation by the fellows provides us with much needed information about areas which need additional attention and improvement.

In addition to the formal mechanisms, fellows are strongly encouraged to give feedback

to the fellowship director on a rolling basis so that corrective action can be taken early on in the training.

Practice Based Learning and improvement.

H. Faculty Evaluation by Fellows

This feedback is particularly important to us as faculty members so that we can continue to improve upon our teaching methods. It assures that our teaching and work style is optimal and productive and highlights problem areas which need additional focus.

These evaluations are **totally anonymous** and are reviewed only by the Chair and the Fellowship Director.

Practice Based Learning and improvement.

VI. Detailed Goals and Learning Objectives

Your experience during the fellowship will be directed toward achieving certain goals and objectives. These are intended to assist you in gaining essential knowledge and important skill sets required to practice as a competent pediatric anesthesiologist.

Recognizing that no physician emerges from training with a comprehensive understanding of every conceivable aspect of pediatric anesthesiology, the objectives are stratified according to the level of proficiency that is expected at the end of the pediatric anesthesia fellowship:

Majority of the goals and objectives in the syllabus of our fellowship program are quasi-essential and cardinal to the safe practice of pediatric anesthesia. These items come under the "COMPREHENSIVE MASTERY" category. Items marked as "SIGNIFICANT EXPERIENCE" (SE) refer to certain skills (e.g. infant spinals) where exposure may differ and may not be enough over the course of just one of year of training. Experience and mastery of these skill sets will come with time and experience.

Concentrating and focusing on the BASICS will strengthen your fundamentals and help you manage more complex cases later in your training as you advance in your fellowship year.

Detailed Goals and Learning Objectives of the Pediatric Anesthesia Fellowship Program are outlined below. The curriculum has been developed based on the new ACGME competency based education guidelines. The contents of the course curriculum have been compiled based on the Course Guidelines developed by the *ASA Committee on Pediatric Anesthesia* and the *ABA Pediatric Anesthesia Certification Exam Content Outline*.

A. Medical Knowledge

1. Goals:

Fellows will learn about the fundamentals of pediatric anesthesia practice. They will gain a broad understanding of the anatomical, physiological and pharmacological characteristics relevant to administering anesthesia to neonates, infants and children. They will understand how specific medical problems and syndromes in children effect their anesthetic management. Over the course of the year the fellows will have read through most of one of the core pediatric anesthesia textbooks.

2. Learning Objectives

a) *Pediatric Developmental Principles*

1. Define Preterm, Prematurity, Neonate, Infant, and Child.
2. Understand the terms Gestational Age and Post-Conceptual Age.
3. Understand the transition from fetal to neonatal circulation including the effect on vascular and cardiac structures (conversion from parallel to series circulation), fetal hemoglobin and blood gas values, arterial and pulmonary artery pressure changes, and ventricular function.
4. Understand normal airway and respiratory development, cardiac development, neurologic development, renal development and hematopoietic development including the conversion of fetal to adult hemoglobin.
5. Understand the effect of prematurity upon organ system development and the short and long-term risks of prematurity including respiratory distress syndrome, broncho-pulmonary dysplasia, apnea, anemia, intra-ventricular hemorrhage, retinopathy of prematurity, and hypoglycemia.

b) *Pharmacokinetics and Pharmacodynamics of Drugs Used in Children*

1. Understand broadly how the pharmacokinetics and pharmacodynamics of drugs differs in infants and children as compared to adults.
2. Understand how Protein Binding, Body Composition, Hepatic and Renal function affects drug dosages and their duration of action.
3. Define MAC and how it differs with age.

4. Review and learn the pharmacology of inhalation agents, intravenous anesthetics, neuromuscular blockers and opioids as relevant to pediatric patients.

c) Fluid and Blood Therapy

1. Learn and understand basics of fluid therapy in children.
2. Fellows will be able to calculate fluid requirements and choose the appropriate fluid type.
3. Learn about glucose metabolism and requirements particularly in the neonatal population.
4. Understand fundamentals of blood replacement therapy. Pediatric dosages and special concerns.

d) Coexisting Disease States

Fellows will learn how the following common disease states affect anesthetic management:

1. Understand the anatomy and pathophysiology of common cyanotic and acyanotic congenital heart lesions including ventricular septal defect, atrial septal defect, patent ductus arteriosus (PDA), critical aortic stenosis and coarctation, pulmonary stenosis, Tetralogy of Fallot, and transposition of the great arteries.
2. Understand the anesthetic implications for children with congenital heart disease including associated syndromes, preoperative assessment, SBE prophylaxis, anesthetic cardiovascular effects, and the effects of an intracardiac shunt on intravenous and inhalation induction of general anesthesia.
3. Understand the pathophysiology and anesthetic implications of obstructive sleep apnea, asthma, and acute upper respiratory tract infection.
4. Learn the common congenital syndromes that include difficult airways, e.g., Pierre Robin, Treacher-Collins, etc.
5. Know the anesthetic implications of cerebral palsy, seizure disorders, hydrocephalus, neuromuscular diseases, muscular dystrophies, and diseases of the neuromuscular junction and neuromuscular transmission.
6. Understand the anesthetic implications of musculoskeletal diseases: scoliosis, achondroplasia, osteogenesis imperfecta.

7. Understand the anesthetic implications for pyloric stenosis, gastroesophageal reflux, renal disease and liver disease in the pediatric patient.
8. Understand the anesthetic implications and perioperative management of inherited disorders of coagulation (e.g. Hemophilia, Von Willibrands Disease) and hemoglobinopathies (e.g. sickle cell disease).
9. Know the anesthetic considerations for children with oncologic disease and who have had chemotherapy.
10. Know the anesthetic implications of children with a newly diagnosed anterior mediastinal mass.
11. Understand the anesthetic considerations for Trisomy 21.
12. Understand the anesthetic considerations for a child with a latex allergy.
13. Know the residual medical problems in children born premature (e.g., bronchopulmonary dysplasia) and the potential impact on anesthetic care.
14. Learn about Malignant Hyperthermia in Children: susceptibility, associated diseases, anesthetic management of MH susceptibility, intraoperative diagnosis and treatment.
15. Learn about the anesthetic implications Endocrine diseases: childhood diabetes, congenital adrenal hyperplasia, childhood obesity etc.

e) *Anesthesia for Specific Neonatal and Pediatric Surgical Conditions*

Fellows will learn about pathophysiology, indications for surgical intervention and anesthetic management of common neonatal surgical emergencies, and other common pediatric surgical conditions.

1. Congenital diaphragmatic hernia (CDH) [SE](#)
2. Inguinal hernia
3. Intussusception
4. Necrotizing enterocolitis (NEC)
5. Omphalocele and Gastroschisis [SE](#)
6. Pyloric stenosis
7. Otitis media requiring myringotomy and tube placement
8. Obstructive sleep apnea or recurrent tonsillitis requiring adenotonsillectomy

9. Acutely bleeding tonsil.
10. Esophageal foreign body.
11. Tracheal or bronchial foreign body.
12. Retropharyngeal and Neck abscesses
13. Epiglottitis.
14. Hydrocephalus requiring ventriculo-peritoneal (VP) shunt insertion or revision.
15. Myelomeningocele. [SE](#)
16. Blocked tear ducts requiring lacrimal duct probing and irrigation
17. Open globe injury
18. Strabismus.
19. Scoliosis.
20. Craniosynostosis. [SE](#)
21. Cleft lip or palate. [SE](#)
22. Tracheoesophageal fistula (TEF). [SE](#)
23. Pediatric trauma. [SE](#)
24. Pediatric burns. [SE](#)

f) Anesthetic Technique:

Preoperative Evaluation and Assessment, Intraoperative and Postoperative Management.

1. Understand the pre-operative issues relevant to the anesthetic care of neonates, infants and children including: coexisting morbidities, medications, allergic reactions, labor and delivery history, maternal history, family history, the normal pediatric physical exam and the evaluation of abnormal findings.
2. Know the ASA guidelines for preoperative fasting including clears, breast milk and formula based upon patient age. Understand the appropriate ordering of preoperative laboratory testing and evaluation.
3. Know the options available for premedication including agents, routes and side-effects.
4. Understand the differences between the various pediatric breathing circuits to provide oxygen and anesthesia.

5. Understand the factors determining the speed of inhalation induction in pediatric patients and the various agents currently available for inhalation induction including the benefits and side-effects of each.
6. Understand the regulation of temperature in infants and children and compensatory mechanisms, effects of anesthesia on temperature and the consequences of hypothermia.
7. Know the differential diagnosis and management of perioperative hyperthermia.
8. Know the age-related fluid and electrolyte requirements for infants and children including calculation of deficit, intra-operative fluid requirements, glucose requirements and the guidelines, indications and side effects for blood and blood product administration in the pediatric patient.
9. Understand the differences between the pediatric airway and the adult airway and the effects on pediatric airway management.
10. Know the various sizes of oral/nasal airways, facemasks, LMAs, blades for laryngoscopy and endotracheal tube sizes (cuffed and uncuffed) and their appropriate use in children of all ages.
11. Know the prevention, management and consequences of laryngospasm.
12. Know the pediatric doses of intravenous anesthetic medications including induction agents, opiates, muscle relaxants, reversal agents and emergency medications including side-effects and contraindications.
13. Know the criteria for tracheal extubation and how to perform a deep extubation safely.
14. Know the therapeutic and toxic doses of local anesthetics in infants and children.
15. Understand the indications and contraindications for spinal and epidural anesthesia and peripheral blocks in infants and children plus side effects and complications.
16. Understand the post-operative anesthetic complications for pediatric patients including stridor, croup, nausea/vomiting and emergence delirium and their management.

B. Patient Care

1. Goals:

1. Fellows must be able to provide anesthetic care that is compassionate, appropriate and effective. They should be able to communicate effectively with the care team.
2. They should demonstrate caring and respectful behavior with the team members, patients and their families.
3. They should be able to gather essential and accurate information about their patients and be able to formulate an anesthetic care plan.
4. They should be able to competently perform airway management and invasive anesthetic procedures.

2. Learning Objectives:

1. Perform appropriate preoperative evaluation of neonates, infants and children.
2. Obtain informed consent from a parent and assent from an appropriately aged child.
3. Be able to formulate an anesthetic plan based on a patient's medical history and planned surgical procedure.
4. Administer premedication to a child.
5. Perform an anesthetic induction in the presence of a parent / guardian.
6. Use a precordial or esophageal stethoscope for an anesthetic.
7. Perform inhalation inductions on pediatric patients of all ages.
8. Be able to place an intravenous catheter in a pediatric patient.
9. Develop a plan when intravenous catheter placement fails.
10. Monitor patient temperature and perform warming methods on neonates, infants and children.
11. Be able to place an arterial catheter and central venous catheter in a pediatric patient.
12. Appropriately choose and administer fluids to pediatric patients of all ages.
13. Estimate Blood Volume and be able to calculate allowable blood loss for children of all ages.
14. Perform mask ventilation, LMA placement and intubation on pediatric patients of all ages.
15. Appropriately manage upper airway obstruction, laryngospasm, and bronchospasm in pediatric patients.
16. Develop the ability to appropriately manage intraoperative hypoxemia.

17. Develop the ability to appropriately manage intraoperative hypocarbia or hypercarbia.
18. Develop the ability to appropriately manage intraoperative hypotension or hypertension.
19. Develop the ability to appropriately manage intraoperative bradycardia or tachycardia.
20. Perform commonly used regional analgesic techniques in pediatric patients (Caudal Epidural Block, Epidural Blockade etc.).
21. Be able to perform Infant Spinals. [SE](#)
22. Perform a preoperative evaluation and participate in an anesthetic for a pediatric patient with congenital heart disease. [SE](#)
23. Perform a preoperative evaluation and present an anesthetic plan for a pediatric patient with an upper respiratory tract infection (URI). Develop a decision process for proceeding with elective surgery in a child with an acute or recovering URI.
24. Identify and evaluate the child with a difficult airway.
25. Plan an anesthetic for a child with a neuromuscular disease.
26. Develop a plan for the perioperative management of a child with sickle cell disease.
27. Develop a plan for the perioperative management of a child with a congenital bleeding disorder.
28. Plan an anesthetic for the prematurely born child.
29. Develop an anesthetic plan for neonates and infants with special surgical problems (TEF, Gastroschisis, Diaphragmatic Hernias, etc.) [SE](#)
30. Obtain PALS certification.

C. Interpersonal and Communication Skills

1. Goals:

Fellows must be able to demonstrate interpersonal and communication skills that result in effective information exchange. They should be able to work effectively with others as a member or leader of a patient care team. They will learn how to effectively gather information using effective listening, explanatory, questioning and writing skills.

2. Learning Objectives:

1. Fellows will be able to establish a sustained, therapeutic and ethically sound relationship with the patient and his/her parents /family.
2. Will be able to effectively retrieve pertinent medical information from the patient, parents and patient care team members.
3. Obtain informed consent and clearly communicate the anesthetic options and risks to the patient / parents.
4. Will coordinate care and work effectively with other patient care team members (surgeons, operating room and ICU nurses, child life specialists etc.)

D. Professionalism

1. Goals:

Fellows must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.

2. Learning Objectives:

1. Fellow will demonstrate respect, compassion and integrity.
2. Fellow will demonstrate a commitment to ethical principles
3. Fellow will demonstrate sensitivity and responsiveness to the needs of parents and children.
4. Will demonstrate sensitivity towards patient's culture, gender and disabilities.
5. Fellow will demonstrate ability to manage conflict
6. Fellow will show commitment to excellence in the care of children and their families.
7. Fellow will demonstrate ongoing commitment towards professional development.
8. Fellow will demonstrate consistent follow up of patients they have cared for including **Post-Operative Visit** or phone call where appropriate. The post-operative follow-up should be discussed with the appropriate faculty.

E. Practice Based Learning and Improvement

1. Goals:

Fellow must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and use this information to improve their patient care practices.

2. Learning Objectives:

1. Learn about the ASA Standards and Guidelines as pertinent to the practice of Pediatric Anesthesia. They will analyze and improve on their practices based on the guidelines and standards set forth by the ASA.
2. Will be able to locate, appraise and assimilate evidence from peer reviewed scientific articles related to our subspecialty. [SE](#)
3. They will explore various ways to find information using information technology (e.g. PubMed, Ovid, MD Consult etc.). They will learn to use our institutions Patient Information System to effectively gather information.
4. He she will be able to apply knowledge based on the appraised literature and strive to practice evidence based medicine.
5. Fellows will assist residents as they rotate through their pediatric anesthesia rotation and will be introduced to a teaching role. [SE](#)
6. They will develop a solid understanding of recent developments and controversies in the management of pediatric patients by searching for and critically reading recent publications. [SE](#)
7. They will take active part in departmental and institutional Quality Improvement and Risk Reduction projects. (M&M, Ticket to Safety etc.) [SE](#)

F. Systems Based Practice

1. Goals:

Fellows must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide effective safe care.

2. Learning Objectives:

1. Fellows need to understand the functioning of the operating room and understand how anesthesia services integrate with the rest of the perioperative services.
2. Fellows will learn to promote patient safety and understand ways to reduce medical errors (e.g. ticket to safety initiative, drugs error prevention program, nursing education initiative etc.)
3. Fellows will have an opportunity to understand the fundamentals of billing and coding pertaining to the practice of anesthesia. [SE](#)
4. The fellow will strive to use medical supplies and equipment in a cost effective manner, and will learn strategies to reduce wastage and minimize cost of care.
5. Fellows will be expected to plan for and provide appropriate care in the context of the wider health care system. They will be expected to initiate and organize appropriate peri-operative consultations, help the service in discharge planning and ensure coordination of pertinent information transfer to caregivers in referring facilities such as rehabilitation facilities or primary care physicians. They will learn to advise primary services on appropriateness of ICU admissions or same day discharges. [SE](#)
6. Fellows will become familiar with the working and development of Anesthesia Information Management Systems (AIMS). They will recognize the strengths and limitations of such systems. [SE](#)

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