

CA-3 Curriculum for Pediatric Anesthesia

West Virginia University Department of Anesthesiology

Description of Rotation or Educational Experience

The CA3 rotation in pediatric anesthesia affords the opportunity for anesthesia residents to:

- Learn how to anesthetize patients ranging in age from neonate to adolescence for noninvasive, invasive, and surgical procedures. This will occur in the diverse settings of the ambulatory surgery center, main operating rooms, and offsite locations.
- Learn how to assess and adapt to the physiologic and anatomic particularities of the pediatric patient in these diverse environments to provide safe patient care.

Patient Care

Goals

Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. CA1 and CA2 residents are expected to:

- Be able to care for patients aged from newborn to adolescence.
- Be able to assess the safety of and adapt to the unique characteristics of the pediatric patient as they proceed through growth and development.
- Be able to address age specific issues regarding pain management, critical perioperative care, and advanced life support in the context of a developmentally immature patient.
- Be able to manage the airway in patients with known or unexpected difficult airways
- Be able to use multimodal techniques for postoperative pain management
- Be able to safely induce and maintain anesthesia in patients with known congenital heart disease

Competencies

- Be able to provide safe general and regional anesthetics for normal newborns, infants, children, and adolescents.
- Be able to extrapolate from experience with normal pediatric patients to provide safe anesthetic care for pediatric patients with variant anatomy or physiology.
- Be able to determine whether or not a facility is suited to provide anesthetic care for a given child undergoing a given procedure.
- Be able to obtain venous and arterial access as necessary in pediatric patients.
- Be able to safely manage the airway of pediatric patients using mask, LMA, endotracheal tube or other technique.
- Be able to use fiberoptic and Bullard for intubation.
- Be able to obtain central venous and arterial access in pediatric patients.

- Be able to provide consultant level expertise on pain management for medical and surgical patients

Objectives

- The residents will administer general anesthesia to patients <3 years of age in the ambulatory setting. This will be accomplished with a minimum of 3 assignments to the ambulatory surgery center for a minimum of 20 patients under three years of age.
- The residents will administer general anesthesia to patients < 3 months of age in the main operating room setting. This will be accomplished with a minimum of 5 patients.
- The residents will transport patients <1 month of age from the NICU to the OR. This will be accomplished with a minimum of 3 patients. Similarly, a minimum of 5 patients will be transported either to or from the PICU and the OR.
- The residents will administer caudal blocks or other techniques of conduction anesthesia to pediatric patients for the purposes postoperative analgesia and/or intraoperative care. This will be accomplished in a minimum of 10 patients.
- The residents will administer sedation and or general anesthesia for children presenting for MRI. This will be accomplished with a minimum of 5 patients.
- The residents will administer general anesthesia to pediatric patients presenting for major surgery in the main operating room. This will be accomplished by a minimum of 10 patients and will include at a minimum a neurosurgical, general pediatric, and an ENT procedure.
- Residents will administer general anesthesia to a minimum of 100 patients <12 years of age.
- Residents will participate in the airway management, including endotracheal intubation, in a minimum of 5 patients under 1 month of age.
- Residents will preoperatively evaluate and discuss with their faculty all patients to be anesthetized.
- Residents will obtain feedback via direct patient visits, telephone, or chart review on the patient and family satisfaction with care and postoperative analgesia where appropriate.
- Residents will perform venipuncture and/or arterial puncture on a minimum of 100 pediatric patients.
- Residents will perform central venous and/or arterial cannulation on a minimum of 10 pediatric patients using ultrasound guidance or anatomic techniques.
- Residents will perform fiberoptic intubation and use the Bullard scope to achieve visualization of the trachea
- Residents will thread epidural catheters from caudal insertion to thoracic interspace.
- Residents will perform inhalational, intravenous, or intramuscular inductions of anesthesia as appropriate in children with cardiac disease.

Medical Knowledge

Goal

Residents must demonstrate knowledge of established and evolving biomedical, clinical,

epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care. Residents are expected to:

- Know the medical disease process particular to the surgery or procedure to be performed.
- Know the particularities of physiology and anatomy that may impact the conduct of the anesthesia or procedure.
- Understand why procedures and surgeries must be performed at particular times in a child's development.
- Understand the concepts of staged repair in congenital heart disease.

Competencies

The resident will:

- Know the requirements for preoperative assessment of children scheduled for surgery
- Know the theory behind and practical application of cardiopulmonary resuscitation and advanced life support in pediatric patients
- Understand the management of normal and abnormal pediatric airways
- Understand the theory behind and practical application of mechanical ventilation in pediatrics, including advanced ventilator management including noninvasive ventilation, pressure support, and APRV
- Understand the theory behind and practical application of temperature regulation in pediatrics
- Understand the theory behind and practical application of pharmacological support of the circulation
- Understand the theory behind and practical application of perioperative fluid therapy, to include patients with hemorrhage or extensive insensible losses
- Understand the proper interpretation of laboratory results in pediatrics, and the clinical indications for obtaining them.
- Understand the theory behind and practical application of general anesthesia for elective and emergent surgery in pediatrics. This is to include neonatal and congenital disorders.
- Understand the theory behind and practical application of regional anesthesia in pediatric patients for both inpatient and outpatient procedures.
- Understand the theory behind and practical application of sedation versus general anesthesia for patients requiring noninvasive or nonpainful procedures.
- Understand how to recognize, evaluate, treat, and prevent pain in pediatric medical and surgical patients
- Know when to consult other specialists for assistance in managing pediatric patients, and also how to provide consultant level expertise to other specialists
- Know how to recognize and treat vital organ dysfunction in the perioperative period
- Understand the diagnosis and perioperative considerations of congenital and acquired disorders of pediatrics.
- Understand the theory behind and practical application of critical care in pediatrics

- Appreciate the need for and how to apply psychological support to patients and their families

Objectives

The resident will be able to:

- Discuss the Practice Recommendations of the American Society of Anesthesiologists Task Force on Pediatric Anesthesia
- Discuss the guidelines recommended by the American Academy of Pediatrics section on Anesthesiology
- Discuss the guidelines recommended by the Society for Pediatric Anesthesia for provision of anesthesia care
- Discuss the guidelines for preoperative fasting and the evidence behind them
- Order only necessary and appropriate preoperative laboratories and studies
- Explain to patients, families, and other care givers the anesthetic plan and answer questions
- Provide appropriate reassurance and psychological support at the preoperative visit
- Administer CPR and ALS to pediatric patients
- Obtain Neonatal Resuscitation Provider Certification
- Intubate the trachea via direct laryngoscopy and fiberoptic technique
- Place LMAs in pediatric patients
- Utilize volume control, pressure control, pressure support, and unassisted spontaneous ventilation via multiple airway devices in pediatric patients.
- Utilize fluid filled warming mattresses, radiant heat devices, and forced air devices to maintain normothermia and or induce hypothermia in pediatric patients.
- Discuss the risks and benefits of hypothermia, normothermia, and hyperthermia in pediatric patients.
- Discuss and administer the proper pharmacologic agents for modification of hemodynamics. Adapt to the requirements of volume, space, and time in administering infusions to pediatric patients.
- Discuss and manage the fluid balance of pediatric patients. Residents will be able to calculate maintenance, deficit, and replacement of fluids by nomogram. Residents will also be able to use goal directed fluid therapy to determine volume resuscitation.
- Discuss and order appropriately common hematologic, blood gas, chemistry, electrolyte, and drug level laboratories.
- Administer safe inhaled and intravenous inductions of anesthesia in pediatric patients.
- Administer safe inhaled maintenance of anesthesia in pediatric patients.
- Discuss the more common congenital and acquired disorders of pediatric patients and their pertinence to perioperative management.
- Discuss the pros and cons of regional anesthesia, including spinals for neonatal surgeries.
- Administer caudal, intrathecal, and other regional anesthesia techniques in children.

- Administer safe sedation for patients undergoing nonpainful or noninvasive procedures. Recognize the need for airway intervention early.
- Recognize, evaluate, treat, and prevent pain in pediatric patients. The resident will be comfortable with pharmacologic, behavioral, and distraction techniques.
- Administer and interpret visual analog scale, Oucher, FACES, and other pain measurement tools in age appropriate fashion.
- Provide, with supervision, consultation services to other practitioners for managing pediatric anesthesia and sedation
- Obtain appropriate consultations from other specialists
- Recognize vital organ dysfunction perioperatively
- Comfortably assume the care of and transfer care to other providers in the case of critically ill children

Practice- Based Learning and Improvement

Goal

Residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life long learning. Residents are expected to develop skills and habits to be able to:

- Be able to choose anesthetic techniques that are safe and effective for patients of various ages. This requires the ability to analyze both positive and negative past experiences and synthesize appropriate anesthetic plans.
- Develop a habit of “obsession with error,” a practice of constantly seeking possible sources of danger or ineffectiveness in the administration of anesthetic by a process of self evaluation and remembrance of past successes and failures.

Competencies

The resident will:

- Understand the need for recording past experiences to formulate future practice
- Acknowledge past experiences of both self and institution and incorporate these into future practice

Objectives

The resident will be able to:

- Adapt practice to fit a patient’s age, comorbidities, and procedure
- Formalize the process of analyzing past and current experiences to determine “what works” and “what doesn’t”
- Communicate own experiences to others to aid in their education and understanding
- Incorporate the experiences of others, including peers, allied health, and others, into their own practice

Systems Based Practice

Goals

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care. Residents are expected to:

- After analyzing a given patient, procedure, and anesthetic environment determine whether or not anesthesia can be safely provided
- Based on prior experience, the resident is able to anesthetize a patient with features that not been previously encountered safely or determine that further resources and/or expertise are required to do so.
- Understand the interactions of billing for procedures, staffing and the community's needs for service.
- Utilize a systems approach to error management

Competencies

The resident will:

- Understand the requirements for administering anesthesia safely to pediatric patients.
- Work effectively in various health care delivery settings and systems relevant to pediatrics
- Advocate for quality patient care and optimal patient care systems
- Understand the need for a redundant, systematic approach to preventing medical errors

Objectives

The resident will be able to:

- Evaluate environments, patients, and procedures as suitable or not for anesthesia care
- Describe the interaction of various quality assurance and patient safety systems
- Discuss the interplay of market forces on administration of anesthesia care
- Design and implement strategies for reducing the incidence of medical errors in own practice

Professionalism

Goals

Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Residents are expected to demonstrate:

- The ability to be empathic with both patients and their families
- A respect for the individuality of pediatric patients at differing stages of development
- Dependable, assured anesthetic care

Competencies

The resident will demonstrate:

- Compassion, integrity and respect for others
- Responsiveness to patient needs that supersedes self interest
- Respect for patient privacy and autonomy

Objectives

The resident will be able to:

- Perform a history and physical examination in a patient who may not understand the medical need in a calming, effective manner
- Be understanding of the behaviors of both parent and child in the sick role
- Identify and modify stress responses in self and others that are particular to taking care of sick children

Interpersonal and Communication Skills

Goals

Residents must demonstrate interpersonal and communication skills that result in the effective exchange of information and teaming with patients, their families, and professional associates. Residents are expected to:

- Be able to communicate with diverse health care providers in diverse settings with diverse patient populations.
- Be able to establish rapport with patients and their families across age and cultural boundaries

Competencies

The resident will:

- Be able to communicate with diverse health care providers
- Be able to use distraction and voice to calm pediatric patients as appropriate
- Establish calm and confidence in parents, understanding that this translates often to calm in the patient
- Maintain comprehensive, timely and legible medical records

Objectives

The resident will be able to:

- Maintain paper and/or electronic records depending on location
- Establish good working relationships with various health care providers
- Distract patients or otherwise obtain compliance for preoperative evaluation, induction of anesthesia, and postoperative care from children

Teaching Methods

- One on one interactions with faculty delivering care
- Preoperative discussions with faculty, preferably the night before, regarding anesthetic considerations for the cases to be encountered.
- Formal discussions on a weekly basis with faculty on topics of particular emphasis.
- Selected readings.
- Problem generated brief literature reviews.

Assessment Method (residents)

- Global Rating Scale

- Chart Stimulated Recall (proposed)
- Case Logs

	Patient Care	Med Knowledge	Practice Based Learning	System Based Practice	Professionalism	Communication
Global Rating Scale	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly
Chart Stimulated Recall (proposed)	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly
Case Log	Monthly	Monthly				

Assessment Method (Program Evaluation)

- Program effectiveness will be evaluated by monitoring resident's evaluations for continued improvement. Resident performance will be evaluated as above.
- The resident will have a verbal exit interview with the faculty responsible for the rotation.
- Residents will fill out a written evaluation of the rotation, as for all other subspecialty rotations.

Level of Supervision

- Direct supervision by faculty

Educational Resources

Recommended readings and references:

- PRIMARY TEXT: Schechter, Berde, Yaster. Pain in Infants, Children, and Adolescents.
- REFERENCE TEXT: Miller's Anesthesia

WEB REFERENCES:

INSTITUTIONAL RESOURCES:

- NICU
- PICU
- Operating rooms 11 and 33, specifically equipped and prepared to handle pediatric cases
- PACU
- A wide variety of and sufficient number of pediatric patients including but not limited to: orthopedics, ENT, cardiac, neurosurgical, general pediatric surgery, ophthalmology, plastics, and urology.
- Infrastructure including allied health, up to date monitoring and anesthetic technology, lab facilities capable of supporting pediatric patients.

Social Justice

West Virginia University is committed to social justice. We concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color, or national group. Any suggestions as to how to further such a positive and open environment in this rotation will be appreciated and given serious consideration.

Attached Addenda

Addendum 1: Pediatric Anesthesia Content Outline

Curriculum Timeline

Prepared by John Morris on 2/14/2007

Approved by the Anesthesiology Education Committee on 2-26-06

Addendum 1

CA-1/CA-2 Content Outline for Pediatric Anesthesia

Department of Anesthesiology

West Virginia University

- 1) Apparatus: Breathing Circuits, Humidity, Thermal Control**
- 2) Premedication: Drugs; Dosage; Routes; Vehicles, Including Eutectic**
- 3) Mixture of Local Anesthetics (EMLA) Cream; Parental Presence**
- 4) Agents and Techniques**
 - a) Induction Techniques
 - b) Anesthetics: Actions Different From Adults
 - c) Neuromuscular Blockers (Sensitivity, Congenital Diseases, Complications of Succinylcholine)
 - d) Regional Anesthesia
- 5) Fluid Therapy and Blood Replacement, Physiologic Anemia, Glucose Requirements**
- 6) Problems in Intubation**
 - a) Full Stomach
 - b) Diaphragmatic Hernia
 - c) Tracheo-esophageal (T-E) Fistula
 - d) Pierre-Robin Syndrome
 - e) Awake/Fiberoptic Intubation
 - f) Dentition)
- 7) Neonatal Physiology**
 - a) Respiratory
 - i) development, anatomy, surfactant
 - ii) pulmonary oxygen toxicity
 - iii) pulmonary function
 - iv) lung volumes vs. adult
 - v) airway differences, infant vs. adult
 - b) Cardiovascular
 - i) transition, fetal to adult
 - ii) persistent fetal circulation
 - c) Retinopathy of Prematurity: Anesthetic Implications
 - d) Metabolism, Fluid Distribution and Renal Function
 - e) Thermal Regulation (Neutral Temperature, Nonshivering
 - f) Thermogenesis)
 - g) Fetal Hemoglobin
 - h) Prematurity, Apnea of Prematurity
 - i) Bronchopulmonary Dysplasia
- 8) Congenital Heart Disease**
 - a) Cyanotic Defects
 - b) Acyanotic Defects
 - c) Primary Pulmonary Hypertension

- d) Altered Uptake/Distribution of IV and Inhalation Anesthetics
- e) Anesthetic Considerations
 - i) cardiac surgery; corrective and palliative
 - ii) noncardiac surgery
- 9) Emergencies in the Newborn**
 - a) Diaphragmatic Hernia
 - b) Tracheoesophageal Fistula
 - c) Neonatal Lobar Emphysema
 - d) Pyloric Stenosis
 - e) Necrotizing Enterocolitis
 - f) Omphalocele/Gastroschisis
 - g) Respiratory Distress Syndrome (RDS): Etiology, Management, Ventilation Techniques
 - h) Myelomeningocele
- 10) Common Pediatric Medical Problems With Anesthetic Implications**
 - a) Upper Respiratory Infections
 - b) Muscular Dystrophies
 - c) Developmental Delay
 - d) Airway Foreign Bodies
- 11) Postoperative Analgesia**
 - a) Systemic Medications and Routes of Administration, Multimodal Therapy
 - b) Regional Techniques: Caudal, Epidural, Nerve Blocks
- 12) Postoperative Nausea and Vomiting: Risk Factors, Prophylaxis, Treatment**