GOALS & OBJECTIVES

DEPARTMENT OF ANESTHESIA
RESIDENCY TRAINING PROGRAM
UNIVERSITY OF MANITOBA

PEDIATRIC ANESTHESIA

INTRODUCTION

The University of Manitoba Training Program for Residents in Anesthesia has been developed in accordance with the guidelines of the Royal College of Physicians and Surgeons of Canada.

The resident is expected to achieve the following goals and objectives in an appropriately incremental manner, as experience increases during the four periods of Pediatric Anesthesia. When printed in italics a competent resident shall demonstrate knowledge of the principles but not be expected to perform these independently.

All appropriate General Program Goals & Objectives apply to this rotation.

Please refer also to the National Curriculum for Canadian Anesthesia Residency for more information on expected knowledge and skills.

MEDICAL EXPERT/CLINICAL DECISION MAKER

1. Resident will acquire an understanding of the anatomical, physiological, pharmacological and psychological differences between the neonate, child and adolescent in relation to anesthesia practice. He/she must demonstrate knowledge concerning:
   a. The Respiratory System
      i. Anatomic differences of the neonate and pediatric airway
      ii. Age differences in; control of respiration, compliance, lung volumes, oxygen consumption
      iii. Normal values for different stage of development
      iv. Neonatal post-op apnea
   b. The Cardiovascular system
      i. Anatomy and physiology of transitional circulation
      ii. Maturation of the myocardium and autonomic nervous system
      iii. Normal vital signs for ages
      iv. Pediatric basic and advanced life support
   c. The Central Nervous system
      i. Anatomy differences - fontanels
      ii. Age differences; intracranial pressure and cerebral blood flow and auto-regulation
   d. The genitourinary system

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i. Renal Maturation  
ii. Fluid & Electrolyte, maintenance requirements, hydration assessment

e. The Gastrointestinal/Hepatic system  
i. Feeding, fasting guidelines,  
ii. Glucose control,  
iii. Maturation of hepatic function

f. Hematological System  
i. Normal values in infants and children  
ii. Natural history of fetal hemoglobin  
iii. Blood component therapy

g. Thermoregulation  
i. Body surface area and heat loss  
ii. Differences and ability to thermo regulate  
iii. Heat loss & prevention

h. Psychological Issues  
i. Anxiety/fear at different ages  
ii. Separation anxiety and parental anxiety  
iii. Use of premeditations  
iv. Consent in the pediatric population

i. Pharmacology  
i. Pediatric induction techniques, inhalation, intravenous, sedation  
ii. Ages difference in; absorption, volume of distribution, protein binding, pharmacokinetics and pharmacodynamics, metabolism, clearance and toxicity

j. Pain Management  
i. Options of systemic analgesia, local infiltration, ultrasound guidance regional nerve block, neuraxial analgesia  
ii. Indications, contraindications, advantages and disadvantage of each modality in the pediatric population.  
iii. Difference in performing caudal and epidural block in children vs. adults

k. Anesthesia Equipment  
i. Equipment specific to patient age, circuits ventilators  
ii. Sizes of masks, ETT, LMA, laryngoscopy blades, Bronchoscope, Glide scope  
iii. Vascular access and invasive monitoring, use of ultrasound for vascular access  
iv. Regional Block Equipment  
v. Warming devices
2. The resident will acquire the knowledge and understanding of Coexisting Disease in Pediatric patients to independently provide anesthetic care for children
   a. Full term infants, former preterm infants and healthy children and adolescents presenting for common surgical procedures. The anesthetic management of neonates and premature infants.
   b. Cardiovascular Disease
      i. ASD, VSD, PDA, TOF and repaired simple lesions
      ii. Cardiomyopathies
      iii. Heart Transplant Recipients
      iv. Complex Congenital Heart Disease e.g. Transposition of the great vessels, Truncus arteriosis, single ventricle physiology, obstructive lesions
      v. Post-Operative: Norword, Bicavolpulmonary anastomosis, Fontan
      vi. Pulmonary hypertension
   c. Respiratory Disease
      i. Upper Respiratory Tract Infections
      ii. Asthma
      iii. Cystic Fibrosis
      iv. Chronic lung disease
      v. Obstructive sleep apnea
      vi. Stridor, congenital and acquired, e.g. cystic hygroma, epiglottitis, croup, retropharyngeal abscess
   d. Gastrointestinal Disease
      i. Hepatobiliary disease
      ii. Liver transplant
      iii. Gastroesophaeal reflux
      iv. Feeding disorders
   e. Neuromuscular Disease
      i. Hydrocephalus
      ii. Repaired spina bifida
      iii. Cerebral Palsy
      iv. Muscular Dystrophy
      v. Mytonic Dystrophy
      vi. Seizures disorders and developmental delay
   f. Infections
      i. Infections diseases HIV, Hepatitis, TB
      ii. Septic shock
   g. Endocrine and Metabolic
      i. Diabetes
      ii. Thyroid
      iii. Obesity, morbid obesity
      iv. Malignant Hyperthermia and Masseter Muscle Spasm
      v. Mitochondrial Disease, Mycopolyscharidoses, Lactic Acidosis
   h. Hematological/Malignancies
      i. Anemia’s- Sickle cell disease, thalassemia’s
      ii. Bleeding disorders - Hemophilia, Von Willebrand’s

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iii. ITP, leukemia
iv. Malignancies
v. *Mediastinal Masses*

i. Common Syndromes
   i. Downs syndrome
   ii. Developmental delay, ADD
   iii. *Other syndrome*; *e.g.* Pierre Robin Sequence, Crouzon’s, Goldenhaar, Treacher Collins etc.

3. The resident must be able to demonstrate understanding of the indications of and to independently provide anesthetic care for children presenting for **common surgical procedures**.

   j. *Pre-term infant and neonate*
      i. *Tracheo-esophageal fistula repair, omphalocele, gastroschisis, congenital diaphragmatic hernia*
      ii. *Bowel obstruction, necrotizing enterocolitic, duodenal atresia, malrotation, volvulus, imperforate anus*
   
   k. Term infant
      i. Hernia,
      ii. Pyloromyotomy
      iii. Laparotomy
   
   l. General surgery
      i. Emergency management and implications of: full stomach, evaluation and resuscitation, fluids and electrolytes, trauma
      ii. Laparoscopic surgery
      iii. Appendectomy, cholecystectomy, splenectomy, anti-reflux surgery
      iv. *Liver transplant, lung transplant*
      v. *Thoracic surgery, thoracoscopy including the need for lung isolation*
   
   m. Otolaryngology
      i. Tonsillectomy and adenoidectomy, including post-tonsillectomy bleed
      ii. Myringotomy, mastoidectomy
      iii. Thyroidectomy tympanoplasty
      iv. *Laryngoscopy for diagnosis and treatment, airway papillomas, epiglotitis*
      v. *Bronchoscopy flexible and rigid and removal of foreign body from the airway*
      vi. *Laryngeal/tracheal reconstruction*
      vii. *Neonatal airway surgery*
      viii. *Tracheostomy*
   
   n. Orthopedic Surgery
      i. Fracture reduction
      ii. Soft tissue surgery
      iii. Club foot repair
      iv. *Congenital/acquired e.g. cerebral palsy*
v. Spinal surgery

o. Plastic Surgery
   i. Cleft lip/palate, isolated
   ii. Burn debridement /skin grafting
   iii. Craniofacial reconstruction surgery

p. Neurosurgery
   i. V-P shunt insertion, revision
   ii. Tumor resection
   iii. Raised ICP
   iv. Myelomeningoccele repair
   v. Neonatal V-P insertion

q. Urology
   i. Circumcision, hypospadias
   ii. Ureteric reimplantation
   iii. Cystoscopy, nephrectomy
   iv. Renal transplant
   v. Bladder exstrophy repair

r. Ophthalmology
   i. Strabismus
   ii. Cataract and Glaucoma
   iii. Eye trauma
   iv. Laser for retinopathy of prematurity

s. Cardiac surgery
   i. Pacemaker insertion
   ii. Radiofrequency ablation
   iii. Cardiac catherization diagnostic and procedural
   iv. PDA ligation
   v. Cardiopulmonary bypass for completer repair/palliative treatment of congenital heart lesion

t. Dental Surgery
   i. Dental extraction/restorations
   ii. Orthognathic surgery

u. Remote Locations
   i. MRI/CT
   ii. Interventional radiology
   iii. Cardiac catherization

v. Perioperative/PACU Issues
   i. Criteria for day surgery, especially for exprematures
   ii. Uncooperative patient, Autism
   iii. Post operative Delirium
   iv. Post extubation stridor
   v. Pain
   vi. Laryngospasm
   vii. Nausea and vomiting

w. Regional

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i. Perform single shot caudal blocks and ultrasound guided nerve blocks
   
   ii. Caudal, epidural and wound catheters

**COMMUNICATOR**

The provision of anesthesia in the pediatric setting is unique as the caregiver must be able to communicate in an appropriate and age specific manner with the patient and their parents/legal guardians as well as other members of the health care team.

The successful resident will:

1. Demonstrate application of knowledge of age specific psychological concerns of pediatric patients with respect to anesthesia and surgery and ability to respond to these concerns at an age appropriate level.

2. Establish a therapeutic relationship with both pediatric patients and parents emphasizing understanding, trust, empathy and confidentiality.

3. Elicit and synthesize relevant information from the patient and family and be able to assess and take into account, the impact of the child’s age, gender, ethno cultural background, social supports, and emotional influences on illness and preoperative clinical course.

4. Discuss appropriate information with the child; family and other healthcare provider, surgeons and nursing staff to facilitate the optimal management plan for the care of the patient. This should include discussion of anesthetic procedures, options and risk, answering questions and decreasing anxiety.

5. Communicate a succinct assessment and peri-operative anesthetic management plan to Attending Staff.

6. Participation in Pediatric Anesthesia Rounds will allow the resident to continue to develop formal communication skills involved in a presentation of a topic and response to question from peers.

**COLLABORATOR**

The successful delivery of peri-operative care requires the effective collaboration of the anesthetist, surgeon, nurses, other trainees, respiratory technicians, anesthesia adjunct personnel and aides.

The successful resident will:

1. Effectively consult with other physicians and health care professionals and demonstrate appropriate judgment regarding the assessment of pediatric anesthetic risk.
2 Coordinate the care of pediatric patients with other members of the operating room team, especially surgeons and nurses as well as staff in the intensive care unit, ward and PACU and in off-site locations such as radiology and the cardiac catherization laboratory.

3 Demonstrate skill in managing urgent and crisis situations such as hemodynamic or respiratory instability, cardiac arrest as a team member or leader.

**MANAGER**

The successful resident will;

1 Demonstrate efficient use of time regarding, patient assessment, operating room set-up, anesthesia induction, and transfer to PACU or ICU, operating room changeover.

2 Demonstrate the ability to make judgments regarding the cost-effective use of anesthesia resources in drug and equipment options and monitoring.

3 Demonstrate awareness of the principles and priorities for patient slating and OR care elective and emergent and ICU/PACU/ward care postoperatively.

4 Demonstrate the ability to manage assigned room with regard to maintaining the schedule or changing the schedule in response to emergencies, additional cases.

5 Demonstrate the ability to manage after hours scheduling of cases including prioritization and adapting to changes.

**SCHOLAR**

The successful resident will;

1 Demonstrate development, implementation and monitoring of personal continuing education strategy.

2 Demonstrate ability to critically appraise current anesthesia literature and apply new knowledge based on appropriate evidence.

3 Demonstrate effective oral presentation of case reports, journal club, or rounds with synthesis of pertinent information.

4 Demonstrate the ability to formulate questions for ongoing appraisal

5 When assigned with medical students or other residents demonstrate effective teaching.

**HEALTH ADVOCATE**
The successful resident will;

1. Demonstrate knowledge and recognition of broad health and societal issues with impact on anesthetic care of the pediatric surgical patient, including, fetal alcohol spectrum disorder, child abuse, maternal and adolescent drug/alcohol abuse and safety promotion: seat belts and helmet use.

2. Knowledge and demonstration of safe anesthesia working practices such as effective anesthesia gas scavenging and appropriate handling of narcotics.

3. Participate in patient safety checklist and time out in the operating room.

PROFESSIONAL

The successful resident will:

1. Deliver anesthesia care with integrity, honesty and compassion.

2. Demonstrate the attitude, behaviors and ethical standards expected of a practitioner of anesthesia.

3. Be aware of the ethical and legal aspects of the care of the pediatric patient.

4. Show recognition of personal limits through appropriate consultation with staff, other physicians and other health professionals and show appropriate respect for those consulted.

5. Demonstrate respect for patients by including the patient and family in discussions of care management.

6. Recognize potential conflicts in patent care situation, professional relationships and value systems and demonstrate the ability to discuss and resolve differences of opinion.

7. Be able to accept constructive feedback and criticism and implement appropriate advice.

For reading Resources please refer to the Anesthesia Tool Kit found on http://umanitoba.ca/faculties/medicine/anesthesia/