The Department of Anesthesiology
Faculty of Medicine
Queen’s University

Postgraduate Education Program in Anesthesiology

Manual
Goals, Objectives and Evaluation

Revised February 2008
The Department of Anesthesiology  
Faculty of Medicine  
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Postgraduate Education Program in Anesthesiology

Goals, Objectives and Evaluation Manual

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Goals of the Postgraduate Program in Anesthesiology

The Goals of the resident training program are outlined on pages 1 – 4. The Objectives to meet these Goals during the residency are outlined in Sections II through VII. The resident must be familiar with these goals and objectives. These goals and objectives can be used as a guide to learning.

The outline of the goals for the postgraduate program in Anesthesiology at Queen’s University conform to those objectives of training outlined in the green “General Information” booklet distributed by the Royal College of Physicians and Surgeons of Canada.

Definition

Anesthesiology is a medical speciality, which includes patient assessment and provision of life support and analgesia for surgical procedures and childbirth; assessment and management of critically ill patients; and the assessment and management of patients with acute and chronic pain.

Goals

Upon completion of residency training, a candidate is expected to be a competent specialist anesthesiologist, capable of assuming a consultant's role in the speciality. The candidate must acquire a working knowledge of the theoretical basis of the speciality, including its foundations in the basic medical sciences and research. Training must also encompass the provision of anaesthesia services for all age groups in varied clinical situations. Performance must, therefore, reflect the anesthesiologist's knowledge of surgery, intensive care and resuscitation, the management of acute and chronic pain and includes assessment and provision of appropriate care of the mother and neonate in obstetrics. The candidate must demonstrate a thorough knowledge of how perioperative management should be modified in the presence of concurrent medical problems.

Residents must demonstrate the knowledge, skills and attitudes relating to gender, culture and ethnicity pertinent to Anesthesia. In addition, all residents must demonstrate an ability to incorporate gender, cultural and ethnic perspectives in research methodology, data presentation and analysis.

CanMEDS 2000 Competencies

At the completion of training, the resident must exhibit the knowledge, skills and attitudes encompassed in the following competencies:

1. Medical Expert
   General Requirements:
   Demonstrate diagnostic and therapeutic skills for ethical and effective patient care.
   Access and apply relevant information to clinical practice
Demonstrate effective consultation services with respect to patient care, education and legal opinions

**Specific Requirements:**

- Demonstrate knowledge of the basic sciences as applicable to anesthesia, including anatomy, physiology, pharmacology, biochemistry and physics.
- Demonstrate knowledge of general internal medicine with particular reference to the cardiovascular, respiratory, renal, hepatic, endocrine, haematologic and neurologic systems.
- Demonstrate knowledge of age related variables in medicine as they apply to neonatal, paediatric, adult and geriatric patient care.
- Demonstrate knowledge of the principles and practice of anesthesia as they apply to patient support during surgery or obstetrics.
- Demonstrate clinical skills necessary for the basics of resuscitation and life support as practised in critical care facilities.
- Demonstrate knowledge of the principles of management of patients with acute and chronic pain.
- Demonstrate knowledge of the role of the consultant anesthesiologist in the provision of safe anesthetic services within both community and teaching facilities.
- Demonstrate clinical skills necessary to the independent practice of anesthesia, including preoperative assessment, intraoperative support and postoperative management of patients of any physical status, all ages and for all commonly performed surgical and obstetrical procedures.
- Demonstrate clinical skills necessary to general internal medicine and intensive care including the ability to investigate, diagnose, and manage appropriately factors that influence a patient's medical and surgical care.
- Demonstrate competence in all technical procedures commonly employed in anesthetic practice, including airway management, cardiovascular resuscitation, patient monitoring and life support, general and regional anesthetic and analgesic techniques and postoperative care.
- Demonstrate knowledge of basic legal matters encountered in anaesthetic practice including informed consent

These requirements are defined in detail in Sections II through V.

### 2. Communicator

**General Requirements:**

Establish a therapeutic relationship with patients and families.
Obtain and synthesize relevant history from patients and families
Listen effectively.
Discuss appropriate information with patients and families and other members of the healthcare team.

**Specific Requirements:**

- Demonstrate consideration and compassion in communicating with patients and families.
- Provide accurate information appropriate to the clinical situation.
- Communicate effectively with medical colleagues, nurses, and paramedical personnel in inpatient, outpatient, and operating room environments.
- Ensure adequate information has been provided to the patient prior to undertaking invasive procedures.
- Recognize that prior to provision of anaesthetic care, specific medical intervention, elimination of risk factors, and genetic evaluation may be required.
- Demonstrate appropriate written communication skills while performing preoperative consultation.

See also Appendix A, Section 4, p. 6 (Interpersonal Skills)
3. Collaborator

General Requirements:
Consult effectively with other physicians and health care professionals.
Contribute effectively to other interdisciplinary team activities.

Specific Requirements:
- Demonstrate ability to function in the operating room environment using the full abilities of all team members.

See also Appendix A, Section 4, p. 6 (Team Participation)

4. Manager

General Requirements:
Utilize personal resources effectively in order to balance patient care, continuing education, and personal activities.
Allocate finite health care resources wisely.
Work effectively and efficiently in a health care organization.
Utilize information technology to optimize patient care and life long learning.

Specific Requirements:
- Demonstrate knowledge of the role of operating room management committees.
- Demonstrate knowledge of the contributors to the cost of anaesthetic care.
- Demonstrate knowledge of the guidelines concerning anaesthetic practice and equipment in Canada.
- Record appropriate information for anaesthetics and consultations provided.
- Demonstrate knowledge of quality assurance, and morbidity and mortality review.

5. Health Advocate

General Requirements:
Identify the important determinants of health affecting patients.
Contribute effectively to improved health of patients and communities.
Recognize and respond to those issues where advocacy is appropriate.

Specific Requirements:
- Demonstrate a strategy to deal with situations where guidelines concerning anaesthetic practice and equipment are not met.

6. Scholar

General Requirements:
Develop, implement, and document a personal education strategy.
Critically appraise sources of medical information.
Facilitate learning of patients, students, and other health professionals.
Contribute to the development of new knowledge.

Specific Requirements:
- Develop criteria for evaluating the anaesthetic literature.
- Critically assess the literature using these criteria.
- Describe the principles of good research.
- Using these principles, judge whether a research project is properly designed.
7. Professional

General Requirements:
Deliver highest quality care with integrity, honesty and compassion.
Exhibit appropriate personal and interpersonal professional behaviours.
Practice medicine ethically consistent with the obligations of a physician.

Specific Requirements:
• Periodically review his/her own personal and professional performance against national standards set for the speciality.
• Include the patient in discussions concerning appropriate diagnostic and management procedures.
• Respect the opinions of fellow consultants and referring physicians in the management of patient problems and be willing to provide means whereby differences of opinion can be discussed and resolved.
• Show recognition of limits of personal skill and knowledge by appropriately consulting other physicians and paramedical personnel when caring for the patient.
• Show a pattern of maintaining current personal clinical skill and knowledge through continuing medical education.

Terminal goal:
The goal of the Queen’s University Postgraduate Anesthesiology program is to incorporate the above goals into the program such that at the end of training the resident will demonstrate excellent skills related to data gathering, use of investigation, clinical judgement and performance of technical procedures.

In brief, given a patient presenting for surgery, the resident will elicit a complete database from history and physical examination. Subsequently, appropriate laboratory tests should be chosen and interpreted correctly. Using this information an appropriate plan of anaesthetic management will be developed.

Further, given an emergency situation, the resident will demonstrate not only appropriate intervention but also appropriate speed of intervention.

The resident will demonstrate skills in performing technical procedures as outlined below.

The resident will:
1. Establish venous access in central and peripheral veins. The resident will know the complications and indications associated with each means of venous access. The resident will perform central pressure monitoring using central venous pressure lines and pulmonary artery, thermodilution cardiac catheters. The resident will know the indications, contraindications, and complications of each approach.
2. Establish arterial lines knowing the indications, contraindications, and complications of this procedure.
3. Perform endotracheal intubation in the awake or the anaesthetised patient using the oral or nasal approach with both regular laryngoscopes and fiberoptic devices. The resident will know the indications, contraindications, and complications of each means of intubation.
4. Perform spinal and epidural anaesthesia knowing the indications, contraindications, and complications of each.
5. Perform a variety of peripheral nerve blocks including those of the brachial plexus, cervical plexus blocks, and intercostal and lower extremity nerves. The resident will know the indications and contraindications for each block. The resident will be able to discuss the complications of each type of block.
7. Be able to evaluate anaesthetic machinery for safe usage.
8. Be able to interpret correctly the data generated from all clinically used physiologic monitoring devices.
The essential goal is that the resident will deliver a safe anaesthetic to any surgical patient, and manage any perioperative complication of the anaesthetic. Success in achieving this skill will be assessed on a daily basis by the attending staff anaesthetist and will be indicated to resident on a bimonthly basis, unless circumstances dictate more immediate feedback.
Guidelines for Graded Responsibility in Anesthesiology Rotations

In order to meet the goals of the resident training program, residents undertake progressively greater individual responsibility for patient care over the course of their training. The following guidelines outline the expectations of the faculty member who is supervising the resident.

Expectations of graded responsibility and resident supervision are governed by the staff anesthetist's ultimate fiduciary responsibility for patient care, the provincial health care insurance plan, surgical patient care committee policy, and the educational requirements of appropriate teaching and meaningful evaluation based on observed performance.

The rate of transfer of graded responsibility, and the measure of teaching and evaluation are determined by level of training, the resident's individual performance to date, resident and staff negotiation of supervisory "comfort" level, and the complexity of the patient's situation and proposed surgery. This is a dynamic process and often negotiated to different endpoints in every preceptor and resident assignment.

While clinical service is an accepted part of the training of a clinical anesthetist, preceptors will attempt to capitalize on the educational components of service, and minimize the delegation of service tasks devoid of educational merit to trainees.

What follows is a guideline of expectations for specialist anesthesia resident supervision that reflects the usual clinical maturation of a trainee in clinical practice.

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C = continuous
I = induction / emergence / significant event
E = supervision for evaluation only

The resident who is PREPARED to accept appropriate responsibility will:

1. Have acquainted themselves with the medical, anaesthetic and surgical implications of the procedure and patient.

2. Come with pertinent identified preoperative measures and investigations that must be in place prior to proceeding. (e.g.) absence of active systemic sepsis, blood crossmatched, PFT's, creatinine, potassium level, etc.

3. Develop an anaesthetic plan including agents, procedures, and monitoring to secure a safe induction, maintenance and emergence from anaesthesia and smooth PARR course. (e.g.) Appropriate anaesthetic technique, pharmacologic choices, needs for-invasive monitoring, anticipated blood loss, patient positioning, etc.
4. Have met and discussed the above with the preceptor, acknowledged levels of supervision/technical help required and stated plans for intraoperative contingencies. Demonstrates active engagement and responsibility for the patient's anaesthetic care.

5. Will have arrived in sufficient time to prepare the anaesthetic machine and ancillary equipment for the case.

The resident **UNPREPARED** to receive responsibility will:

1. Come without any preparatory reading or knowledge of the case or patient problems.

2. Be unable to identify key preoperative investigations or measures. Will proceed without any thought to contraindications or measures for minimizing patient risk.

3. Have an anaesthetic plan that is "cookbook" oriented and incomplete, inappropriate or inadequate for the case. Cannot identify key intraoperative pitfalls or safe anaesthetic endpoints.

4. Be unable to participate in a meaningful discussion of the anaesthetic plan. Relies on passive learning and demonstrates no ownership for patient care. Enthusiasm limited to new anaesthetic procedures without justification of risk/benefit to patient.

5. Arrives late or allows insufficient time for anaesthetic equipment preparation.

Reviewed and Approved PGE Committee May 15, 2002
Concurrent Coverage

In conjunction with the development of a resident’s skills, the resident will assume progressively more responsibility in the Operating Room. This increase in responsibility is encouraged and necessary for the development of a resident’s judgement and confidence. Occasionally, residents who have demonstrated sufficient aptitude may be asked to run a list by themselves while a staff individual will be responsible for covering two rooms. Concurrent coverage is limited to 2 assigned days of concurrent coverage per resident per month. When this double-booking, or concurrent coverage, occurs every attempt will be made to make this a teaching/learning experience.

Residents running a concurrent coverage room should be assigned to lists within their assigned teaching blocks whenever possible. Concurrent coverage rooms should usually not be “late” rooms. In order to maximize concurrent coverage rooms as a learning experience, the Anesthesiologist who is responsible for the two rooms should:

1. Always be immediately available for each resident.
2. Establish learning objectives for the day with both of the residents prior to the beginning of each list.
3. Determine prior to the beginning of the list that each resident is prepared to accept the responsibility of running an OR on their own, according to the criteria for PREPARED Residents (above).

Residents who are running concurrent coverage rooms should:

1. Expect to be fully PREPARED (above) to anesthetize each patient on their list with minimal supervision.
2. Be able to discuss their learning objectives for the day with the attending anesthesiologist.

Reviewed and Approved PGE Committee June 10, 2004
Section II:
Goals and Objectives for the PGY1 Year of the Postgraduate Program in Anesthesiology

The discipline of Anaesthesia interfaces with many other medical disciplines. The PGY 1 year is broadly based in order to provide the basis for a wide understanding of medicine and to facilitate success on the LMCC II examination, a current requirement of all Canadian licensing authorities for licensure.

Residents who are pursuing electives in the PGY year must have acceptable academic records AND meet the program's criteria for elective approval by the PGE Committee. The Anaesthesia rotation objectives are included in the general objectives (vide supra).

The core PGY1 Year will consist of the following rotations:

- Pediatrics 1 month
- Emergency 2 months
- General Internal Medicine 1 month
- Cardiology 1 month
- General Surgery 2 months
- Anesthesiology 4 months
- Selected Rotation 1 month
Pediatrics

- Medical Expert

General

At the completion of the rotation The PGY-1 Trainee will demonstrate:

1. Knowledge of normal behaviour, growth and development with specific knowledge of renal, respiratory, and cardiac physiologic development in a child.
2. Knowledge of current feeding practices of infants and children.
3. The ability to manage common paediatric problems in ambulatory and hospital settings.
4. The ability to use unique interview and examination techniques with children and their families.

The following goals when achieved will be useful knowledge for the LMCC Part II:

5. Knowledge of the natural history of acute/chronic disorders.
6. Knowledge of communicable diseases and immunization schedules.
7. Knowledge of the principles of genetic counseling.
8. The ability to give preventive/anticipatory guidance.
9. The ability to manage handicapped children and their families.
10. Knowledge of the special needs of the adolescent.

Specific

The PGY-1 Trainee is expected to demonstrate an effective approach and appropriate management to the patient presenting with the following:

**Neonatal:**
- newborn assessment, neonatal cyanosis and jaundice
- normal growth and development (tall stature, short stature)
- failure to thrive, feeding problems
- prematurity, sudden infant death syndrome
- chromosomal disorders
- skin rashes

**Developmental:**
- learning disorders, sensory/speech disorders
- abnormal sexual maturation
- enuresis
- scoliosis, leg pain in childhood
- obesity

**General Medicine:**
- ingestion of poisons
- febrile illnesses and infections, HIV in children
- dyspnea, wheezing, stridor
- seizure disorder
- gastroenteritis/diarrhea, constipation
- child abuse

**Procedures**

The PGY-I Trainee will demonstrate an effective approach to:
• venous access
• lumbar puncture (perform at least one)

• Communicator

The resident will be able to effectively communicate with children of all ages and their parents/caregivers
The resident will be able to discuss management plans with patients and family members in a clear understandable fashion
The resident will be able to take an appropriate history from various sources
The resident will be able to present cases to the attending staff in a clear, concise manner
Charting will be clear and legible at all times

• Collaborator

The resident will consult effectively and appropriately with other health care personnel to achieve suitable care for the patient
The resident will act as a consultant when appropriate and make his/her suggestions in clear, concise language that is easy to decipher

• Manager

The resident will effectively manage the pediatric inpatients, triage appropriately, as well as assess patients elsewhere in the hospital when needed
The resident will ensure that orders are done in a timely manner so that they can be carried out expeditiously
The resident will supervise junior members of the health care team appropriately

• Health Advocate

The resident will always be an advocate for the patient
The resident will ensure that the child’s safety is placed above all else
The resident will ensure that all standards of care are met when caring for a child
The resident will use limited health care resources in an appropriate manner

• Scholar

The resident will embark on self-directed learning and will continue to read around cases, consult the literature and improve his/her knowledge base
The resident will attend all rounds and teaching sessions
The resident will come to the hospital prepared and organized in order to care for the patients
The resident will teach junior members (medical students) of the health care team

• Professional

The resident will always be respectful to patients and families as well as other health care professionals
The resident will conduct his/herself in an honest, responsible manner at all times
The resident will be a productive member of the health care team
The resident will act in an ethically and morally sound manner
Emergency Medicine

- Medical Expert

General

At the completion of the rotation The PGY-1 Trainee will demonstrate the:

1. Ability to triage the critically ill patient and set priorities in management.
2. Ability to manage the initial stabilization of the patient with multi-system failure/trauma.

Specific

At the end of the rotation The PGY-1 Trainee will demonstrate an effective approach (including the appropriate assessment, differential diagnosis, and management) of the patient presenting with the following:

- trauma
- rape and sexual assault
- poisoning
- chest pain
- headache
- impaired consciousness (coma)
- seizures
- new onset neurologic deficit (stroke)
- shocks
- acute respiratory distress febrile illness and infections
- abdominal pain
- nausea/vomiting/dehydration
- emotional or psychiatric crisis
- syncope/dizziness
- acute joint pain, back pain, leg pain
- jaundice

Procedures

The PGY-1 Trainee will demonstrate skills in:

- basic and advanced Cardiac Life Support
- application of plaster cast
- suturing: skin, face, hands, etc.
- diagnostic tap: lumbar, chest
- closed reduction of fractures
- local and regional anaesthesia
• **Communicator**

The resident will be able to effectively communicate with patients and their families
The resident will be able to communicate effectively with nursing staff
The resident will be able to take an appropriate history from various sources
The resident will be able to present cases to the attending staff in a clear, concise manner
Charting will be clear and legible at all times

• **Collaborator**

The resident will consult effectively and appropriately with other health care personnel to achieve suitable care for the patient
The resident will arrange appropriate investigations and tests that are indicated
The resident will convey information to the necessary professionals to achieve optimal care for their patient

• **Manager**

The resident will triage appropriately
The resident will ensure that orders are done in a timely manner so that they can be carried out expeditiously
The resident will supervise junior members of the health care team appropriately
The resident will demonstrate effective use of personnel, facilities, equipment and backup resources

• **Health Advocate**

The resident will always be an advocate for the patient
The resident will ensure that the patient’s safety is placed above all else
The resident will ensure that all standards of care are met
The resident will use limited health care resources in an appropriate manner

• **Scholar**

The resident will embark on self-directed learning and will continue to read around cases, consult the literature and improve his/her knowledge base
The resident will attend all rounds and teaching sessions
The resident will come to the hospital prepared and organized in order to care for the patients
The resident will teach junior members (medical students) of the health care team

• **Professional**

The resident will always be respectful to patients and families as well as other health care professionals
The resident will conduct his/herself in an honest, responsible manner at all times
The resident will be a productive member of the health care team
The resident will act in an ethically and morally sound manner
General Internal Medicine

- Medical Expert

General

At the completion of the rotation, the PGY-1 Trainee will demonstrate:

1. Ability to manage patients with a variety of acute and chronic disease of various organ systems.
2. Ability to appropriately refer patients to consultants and community services.
3. Ability to provide emotional support for patients and their families.
4. Ability to elicit the active participation of patients and families in their care where appropriate.

Specific

The PGY-1 Trainee will demonstrate the appropriate recognition and management of patients with common symptoms/disease complexes in the following subspecialties within Internal Medicine:

- Allergy, Immunology, Rheumatology
- Cardiovascular Medicine
- Endocrinology
- Gastroenterology
- Geriatrics
- Haematology
- Nephrology
- Neurology
- Respiratory Disorders
- Oncology

Procedures

The PGY-1 Trainee is expected to know and possibly be able to demonstrate an effective approach to the following procedures:

- venipuncture
- arterial puncture for Blood Gas Analysis (taking/interpretation)
- inhalation therapy
- central venous access
- ACLS (maintenance)
- pulmonary function studies
- thoracenteses
- lumbar puncture
- chest tube insertion

- Communicator

The resident will be able to effectively communicate with patients and their families.
The resident will be able to discuss management plans with patients and family members in a clear understandable fashion.
The resident will be able to take an appropriate history from various sources.
The resident will be able to present cases to the attending staff in a clear, concise manner.
The resident should be able to provide emotional support for patients and their families.
Charting will be clear and legible at all times.
• Collaborator

The resident will consult effectively and appropriately with other health care personnel to achieve suitable care for the patient
The resident will act as a consultant when appropriate and make his/her suggestions in clear, concise language that is easy to decipher
The resident will arrange appropriate investigations and tests that are indicated
The resident will convey information to the necessary professionals to achieve optimal care for their patient

• Manager

The resident will effectively manage the inpatients, triage appropriately, as well as assess patients elsewhere in the hospital when needed
The resident will ensure that orders are done in a timely manner so that they can be carried out expeditiously
The resident will supervise junior members of the health care team appropriately

• Health Advocate

The resident will always be an advocate for the patient
The resident will ensure that the patient’s safety is placed above all else
The resident will ensure that all standards of care are met when caring for each patient
The resident will use limited health care resources in an appropriate manner

• Scholar

The resident will embark on self-directed learning and will continue to read around cases, consult the literature and improve his/her knowledge base
The resident will attend all rounds and teaching sessions
The resident will come to the hospital prepared are organized in order to care for the patients
The resident will teach junior members (medical students) of the health care team

• Professional

The resident will always be respectful to patients and families as well as other health care professionals
The resident will conduct his/herself in an honest, responsible manner at all times
The resident will be a productive member of the health care team
The resident will act in an ethically and morally sound manner
Cardiology

- Medical Expert

Goal:
The resident will assess the patient and begin to outline a course of therapy and investigation for a patient with a cardiac problem.

Objectives:
1. The resident should acquire the following knowledge about the normal heart and blood vessels as they progress through the cardiology rotation:
   - The resident will understand the embryology of the heart.
   - The resident will understand the anatomy of the heart.
   - The resident will understand the normal physiology of the cardiovascular system.
   - The resident will understand the generation and conduction of the electrical activity in the heart.
   - The resident will understand the mechanism of metabolic regulation within the heart.

2. In examining the heart and the blood vessels:
   - The resident will be able to take a complete cardiovascular history and physical examination of the heart, peripheral vasculature, precordium, and lungs.
   - The resident will be able to interpret the resting electrocardiogram and chest x-ray.
   - The resident will assess patients with abnormal myocardial contractility, electrical or conduction abnormalities in the heart, and myocardial ischemia and infarction.

3. Disorders of the cardiovascular system:
   - The resident will diagnose, investigate and manage patients with chest pain.
   - The resident will describe the pathophysiology of heart failure. The resident will be able to diagnose, investigate and treat heart failure.
   - The resident will discuss the pathophysiology of hypotension and shock. The resident will describe the physical findings, investigation and management of shock and acute pump failure.
   - The resident will describe the pathophysiology and investigation of high output states.
   - The resident will describe the disturbances of cardiac rhythm and conduction. The resident will describe and investigate mechanisms of arrhythmias and conduction abnormalities. The resident will be expected to manage all common arrhythmias and rhythm abnormalities.
   - The resident will have a clear differential diagnosis and plan of management of the patient with syncope.
   - The resident will describe the mechanisms of sudden death. The resident will discuss the predictors and prevention of sudden cardiac death.
   - The resident will discuss the current standards of cardiopulmonary resuscitation.

4. Disease of the heart and blood vessels:
   - The resident will describe the history, physical findings, investigation and current management of patients with:
     - rheumatic fever
     - aortic valve disease
     - mitral valve disease
     - tricuspid and pulmonary valve disease

5. Coronary Artery Disease:
   - The resident will understand the factors influencing atherogenic heart disease, cholesterol metabolism, and prevention of coronary atherosclerosis.
• The resident will understand the pathophysiology and investigation of angina pectoris, myocardial infarction and other manifestations of myocardial ischemia.
• The resident will discuss the diagnosis and treatment of nonatherosclerotic coronary artery disease including coronary artery spasm.
• **Systemic arterial hypertension.** The resident will understand the pathophysiology of hypertension. The resident will describe a plan of investigation and management to the hypertensive patient. The resident will outline the anaesthetic implications of hypertension.
• **Pulmonary Hypertension.** The resident will discuss the investigation, diagnosis and treatment of primary pulmonary hypertension, pulmonary embolism, pulmonary infarction, acute cor pulmonale and chronic cor pulmonale.
• The resident will discuss the pathophysiology, investigation, treatment and complications of bacterial endocarditis. The resident will also be familiar with commonly used protocols for prophylaxis of bacterial endocarditis.
• The resident will be familiar with myocardial disease. The resident will diagnose, treat and investigate cardiomyopathies.
• The resident will diagnose, manage and treat the patient with acute and chronic pericardial disease.
• The resident will describe the effects of trauma on the heart.
• The resident will discuss the diagnosis, investigation and treatment of patients who have peripheral vascular disease. The resident will describe the current management of aneurysms of the aorta. The resident will describe the physical findings, investigation and treatment of patients who have peripheral venous disease.

6. The resident will be familiar with the following techniques and therapeutic procedures. The resident will describe the indications for each intervention and be able to interpret at a basic level the data generated from these techniques. The resident will discuss the complications of these techniques:
• electrocardiography
• exercise test
• Holter monitoring
• cardioversion
• percutaneous transluminal coronary angioplasty

7. The resident will describe the indications for cardiac pacing. The resident will discuss the various forms of cardiac pacemakers.

**Communicator**

The resident will be able to effectively communicate with patients and their families
The resident will be able to discuss management plans with patients and family members in a clear understandable fashion
The resident will be able to take an appropriate history from various sources
The resident will be able to present cases to the attending staff in a clear, concise manner
The resident should be able to provide emotional support for patients and their families
Charting will be clear and legible at all times

**Collaborator**

The resident will consult effectively and appropriately with other health care personnel to achieve suitable care for the patient
The resident will act as a consultant when appropriate and make his/her suggestions in clear, concise language that is easy to decipher
The resident will arrange appropriate investigations and tests that are indicated
The resident will convey information to the necessary professionals to achieve optimal care for their patient
Manager

The resident will effectively manage the inpatients, triage appropriately, as well as assess patients elsewhere in the hospital when needed
The resident will ensure that orders are done in a timely manner so that they can be carried out expeditiously
The resident will supervise junior members of the health care team appropriately

Health Advocate

The resident will always be an advocate for the patient
The resident will ensure that the patient’s safety is placed above all else
The resident will ensure that all standards of care are met when caring for each patient
The resident will use limited health care resources in an appropriate manner

Scholar

The resident will embark on self-directed learning and will continue to read around cases, consult the literature and improve his/her knowledge base
The resident will attend all rounds and teaching sessions
The resident will come to the hospital prepared and organized in order to care for the patients
The resident will teach junior members (medical students) of the health care team

Professional

The resident will always be respectful to patients and families as well as other health care professionals
The resident will conduct his/herself in an honest, responsible manner at all times
The resident will be a productive member of the health care team
The resident will act in an ethically and morally sound manner
General Surgery

The resident may spend 2 months on general surgery, or one month on general surgery and one month on the cardiovascular surgery service.

- Medical Expert

General

At the completion of the rotation The PGY-1 Trainee will demonstrate the:

1. Ability to diagnose and manage common acute and chronic problems in the office, emergency room and hospital relating to the surgical specialty rotation on which the resident is placed.
2. Effective utilization of consultants, knowledge of pre- and post-operative management.
3. Ability to explain and justify common operative procedures to patients.
4. Ability to treat common problems arising during pre- and post-operative period (e.g., diabetes, infections, fluid and electrolyte imbalance).

The resident will accomplish this by spending approximately equal amounts of time in the operating room, the clinic and on the wards. This will be aided by rounds and conferences where appropriate

Specific

The PGY-1 Trainee is expected to be able to describe and aid in the effective preoperative and postoperative management of the patient presenting with the following:
- acute abdomen
- appendicitis
- cholecystitis/lithiasis
- hernias (hiatus, inguinal, incisional, umbilical)
- tumors: benign/malignant breast, bowel, lung, skin, thyroid, pancreas)
- fluid resuscitation in the dehydrated/hypovolemic patient
- trauma (abdominal; and head, neck, thoracic and vascular)
- problems unique to large complicated surgical cases ie. Thoracoabdominal esophagogastrectomies, Whipple procedures, Liver resections, AAA repairs, thoracotomies
- routine pediatric surgical problems and procedures

Procedures

The PGY-1 Trainee will demonstrate skills in:
- incision and drainage of abscesses
- placement of a nasogastric tube
- insertion of chest tube (on thoracic service)
- simple skin suturing

- Communicator

The resident will be able to effectively communicate with patients and their families on the ward, in the ER and in a clinic setting
The resident will be able to discuss management plans with patients and family members in a clear understandable fashion
The resident will be able to present cases to the attending staff in a clear, concise manner
The resident should be able to provide emotional support for patients and their families
The resident should be able to communicate effectively with all members of the OR team
Charting will be clear and legible at all times
• **Collaborator**

The resident will consult effectively and appropriately with other health care personnel to achieve suitable care for the patient.
The resident will act as a consultant when appropriate and make his/her suggestions in clear, concise language that is easy to decipher.
The resident will arrange appropriate investigations and tests that are indicated.
The resident will convey information to the necessary professionals to achieve optimal care for their patient.

• **Manager**

The resident will effectively manage the inpatients, triage appropriately, as well as assess patients elsewhere in the hospital when needed.
The resident will ensure that orders are done in a timely manner so that they can be carried out expeditiously.
The resident will supervise junior members of the health care team appropriately.

• **Health Advocate**

The resident will always be an advocate for the patient.
The resident will ensure that the patient’s safety is placed above all else.
The resident will ensure that all standards of care are met when caring for each patient.
The resident will use limited health care resources in an appropriate manner.

• **Scholar**

The resident will embark on self-directed learning and will continue to read around cases, consult the literature and improve his/her knowledge base.
The resident will attend all rounds and teaching sessions.
The resident will come to the hospital prepared and organized in order to care for the patients.
The resident will teach junior members (medical students) of the health care team.

• **Professional**

The resident will always be respectful to patients and families as well as other health care professionals.
The resident will conduct himself/herself in an honest, responsible manner at all times.
The resident will be a productive member of the health care team.
The resident will act in an ethically and morally sound manner.

**Evaluation:**
With the exception of the Anaesthesia rotations, evaluation is by ITER and the LMCCII examination.

Revised June 2005
Anesthesiology 1:

During the first two months of anesthesia training at the PGY1 level, residents will be introduced to the anesthesiologist’s role in perioperative care

- **Medical Expert**

**Preoperative assessment:**
The resident will be able to:

- after an appropriate history and physical exam, correctly assign an ASA score to the patient.
- demonstrate an equivalent knowledge of the action, dose and problems associated with drugs commonly used in the resident's anesthetic practice to that knowledge required in the undergraduate course of medical pharmacology. Included should be; an induction agent, a volatile anesthetic, a narcotic and antagonist, muscle relaxants (Succinylcholine and a non-depolarizing relaxant) and an antagonist, a local anesthetic drug, and those drugs required for resuscitation (to the level of ACLS).
- demonstrate some knowledge of the interaction of the above drugs with other medications and with common patient problems.
- demonstrate some knowledge of the limitations of various basic monitoring equipment, and be able to select appropriate monitors for the patient’s intraoperative course.

**Clinical Performance**

- **Patient Assessment:**
  - The resident will demonstrate a basic ability to assess a patient's airway, breathing, and cardiovascular system, during the pre-anesthetic, anesthetic, and post anesthetic periods.

- **Judgment and Management**
  - The resident will demonstrate the ability to perform a satisfactory machine check.
  - The resident will be familiar with a fundamental plan of anesthesia useful in ASA Class 1-2 patients for peripheral surgery.
  - The appropriate use of basic monitors is expected.
  - The resident will demonstrate that (s)he is aware of his/her limitations.

- **Technical Skills**
  - The resident will demonstrate the ability to cannulate peripheral veins successfully (more often than not).
  - The resident will demonstrate the ability to maintain an airway with either mask or endotracheal tube most of the time; and to recognize problems that may occur with the airway.
  - The resident will demonstrate the ability to perform with assistance:
    - simple anesthetic procedures (eg. D&C, cystoscopy, laparoscopy) for ASA I and II patients,

- **Staff Intervention**
  - At this stage both direction and intervention by the staff are expected as part of the normal teaching and learning experience.

  - **Communicator**

The resident will be able to effectively communicate with patients and their families prior to their anesthetic
The resident will be able to discuss management plans with patients and family members in a clear understandable fashion
The resident will be able to present cases to the attending staff in a clear, concise manner
The resident should be able to communicate effectively with all members of the OR team
Charting will be clear and legible at all times

- **Collaborator**

  The resident will consult effectively and appropriately with other health care personnel to achieve suitable care for the patient and optimization prior to surgery
  The resident will arrange appropriate investigations and tests that are indicated
  The resident will convey information to the necessary professionals to achieve optimal care for their patient

- **Manager**

  The resident will effectively manage their OR ie: setting up in the morning, checking the machine, preparing appropriately for each case
  The resident will ensure that their attending staff is aware of any complications or delays

- **Health Advocate**

  The resident will always be an advocate for the patient
  The resident will ensure that the patient’s safety is placed above all else
  The resident will ensure that all standards of care are met when caring for each patient
  The resident will use limited health care resources in an appropriate manner

- **Scholar**

  The resident will embark on self-directed learning and will continue to read around cases, consult the literature and improve his/her knowledge base
  The resident will attend all rounds and teaching sessions
  The resident will come to the hospital prepared are organized in order to care for the patients

- **Professional**

  The resident will always be respectful to patients and families as well as other health care professionals
  The resident will conduct his/herself in an honest, responsible manner at all times
  The resident will be a productive member of the health care team
  The resident will act in an ethically and morally sound manner
Anesthesiology 2:

During the second two months of anesthesia training at the PGY1 level, residents will be introduced to more complicated cases and will begin to take call with a senior resident

- **Medical Expert**

**Preoperative assessment:**

The resident will be able to:

- after an appropriate history and physical exam, correctly assign an ASA score to the patient.
- demonstrate an equivalent knowledge of the action, dose and problems associated with drugs commonly used in the resident's anesthetic practice in a more indepth manner. Residents should be aware of indications, contraindications, side effects, dosage and pharmacokinetics/dynamics of commonly used drugs. Included should be; induction agents, volatile anesthetics, narcotics and antagonists, muscle relaxants and reversal agents, local anesthetics, and those drugs commonly required for resuscitation.
- demonstrate some knowledge of the interaction of the above drugs with other medications and with common patient problems.
- demonstrate some knowledge of the limitations of various basic monitoring equipment, and be able to select appropriate monitors for the patient’s intraoperative course.

**Clinical Performance**

- **Patient Assessment:**
  - The resident will demonstrate a basic ability to assess a patient's airway, breathing, and cardiovascular system, during the pre-anesthetic, anesthetic, and post anesthetic periods.
  - The resident will be familiar with a fundamental plan of anesthesia useful in ASA Class 1-2 patients for peripheral surgery as well as more complex cases
  - The resident will be able to assess laboring patients who request an epidural
  - The resident will be able to respond to code 99s and cardiac arrests appropriately as well as being an effective member of the trauma team
  - The resident will learn to trouble-shoot common acute pain management problems and scenarios safely and efficiently
  - The resident will demonstrate that (s)he is aware of his/her limitations.

- **Technical Skills**
  - The resident will demonstrate the ability to cannulate peripheral veins successfully
  - The resident will demonstrate the ability to maintain an airway with either mask or endotracheal tube most of the time; and to recognize problems that may occur with the airway.
  - The resident will be able to successfully place a labor epidural in a safe manner
  - The resident will demonstrate the ability to perform with assistance:
    - simple anesthetic procedures (eg. D&C, cystoscopy, laparoscopy, arthroscopy) for ASA I and II patients,

- **Staff Intervention**
  - At this stage both direction and intervention by the staff are expected as part of the normal teaching and learning experience.

**Communicator**

The resident will be able to effectively communicate with patients and their families prior to their anesthetic
The resident will be able to discuss management plans with patients and family members in a clear understandable fashion
The resident will be able to present cases to the attending staff in a clear, concise manner
The resident should be able to communicate effectively with all members of the OR team
Charting will be clear and legible at all times

- **Collaborator**

  The resident will consult effectively and appropriately with other health care personnel to achieve suitable care for the patient and optimization prior to surgery
  The resident will arrange appropriate investigations and tests that are indicated
  The resident will convey information to the necessary professionals to achieve optimal care for their patient
  The resident will hand over to the oncoming resident any problems experienced during their night on call including APMS patients and CV

- **Manager**

  The resident will effectively manage their OR ie: setting up in the morning, checking the machine, preparing appropriately for each case
  The resident will ensure that the C/S room and the emergency pack are stocked when they are on call
  The resident will ensure that their attending staff is aware of any complications or delays

- **Health Advocate**

  The resident will always be an advocate for the patient
  The resident will ensure that the patient’s safety is placed above all else
  The resident will ensure that all standards of care are met when caring for each patient
  The resident will use limited health care resources in an appropriate manner

- **Scholar**

  The resident will embark on self-directed learning and will continue to read around cases, consult the literature and improve his/her knowledge base
  The resident will attend all rounds and teaching sessions
  The resident will come to the hospital prepared are organized in order to care for the patients

- **Professional**

  The resident will always be respectful to patients and families as well as other health care professionals
  The resident will conduct his/herself in an honest, responsible manner at all times
  The resident will be a productive member of the health care team
  The resident will act in an ethically and morally sound manner

References

*Clinical Anesthesiology, G. E. Morgan and M. S. Mikhail, 2nd ed., 1996*

Evaluation:

*Daily evaluation summaries*

Block Coordinator

**Dr. Melanie Jaeger**

revised March 2005
Section V: Block Rotation Objectives of the Postgraduate Program in Anesthesiology

The clinical experience that the residents receive will be divided into blocks which will normally be of one to two months duration. Each resident can expect to move through the blocks two or three times during their training, as a junior and as a senior resident. The objectives for the blocks are an amalgamation of the basic science (Section III) and clinical science (Section IV) objectives. The block objectives also contain some indication of the nature and number of technical procedures that must be performed by the residents during their block rotation. Each block coordinator will organize an appropriate evaluation for the material covered during the block. The clinical experience is divided into the following blocks:

<table>
<thead>
<tr>
<th>Code</th>
<th>Subspecialty</th>
<th>Coordinator</th>
<th>Block</th>
<th>Duration/yr</th>
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<tr>
<td>KGH</td>
<td>Cardiac</td>
<td>Dr. M. Cummings</td>
<td>Cardiac</td>
<td>1 month PGY2/3, 1 month PGY4/5</td>
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<td>Vascular</td>
<td>Dr. R. Allard</td>
<td>KGH</td>
<td>PGY3-5</td>
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<td></td>
<td>Thoracic</td>
<td>Dr. M. Fleming</td>
<td>KGH</td>
<td>PGY3-5</td>
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<td>Neurosurgery</td>
<td>Dr. B. Simchison</td>
<td>KGH</td>
<td>PGY3-5</td>
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<td>OB</td>
<td>1 month PGY2, 1 month PGY5</td>
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<td>Orthopedics</td>
<td>Dr. M. Jaeger</td>
<td>KGH</td>
<td>PGY2/3</td>
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<td>Trauma, Burns, Plastic Surgery</td>
<td>Dr. M. McMullen</td>
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<td>Chronic Pain</td>
<td>Dr. Richard Henry</td>
<td>CHRONIC PAIN</td>
<td>1-2 months PGY3-5</td>
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<td>KGH</td>
<td>PGY2/3</td>
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<td>Urology</td>
<td>Dr. A. Froese</td>
<td>KGH</td>
<td>PGY2/3</td>
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<td>Dr. D. Goldstein</td>
<td>APS</td>
<td>1 month PGY2, 1 month PGY5</td>
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<td>Preassessment Clinics</td>
<td>Dr. J. vanVlymen</td>
<td>PAC</td>
<td>Interspersed PGY2-5</td>
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<td>Gynecology</td>
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<td>KGH</td>
<td>PGY 2-4</td>
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<tr>
<td></td>
<td>Elective</td>
<td>Various</td>
<td>KGH</td>
<td>1-4 months</td>
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<td>Ambulatory, ENT, Ophthalmology</td>
<td>Dr. L. Patterson</td>
<td>HDH</td>
<td>1-2 months</td>
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<td>Paediatrics</td>
<td>Dr. T. Ashbury</td>
<td>KGH/HDH</td>
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<td>CHEO*</td>
<td>Paediatrics</td>
<td>Dr. Abu Shahwan</td>
<td>CHEO</td>
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<td>Airway</td>
<td>Dr. Rick Zamora</td>
<td>KGH</td>
<td>1 month PGY2</td>
</tr>
</tbody>
</table>

* Children's Hospital of Eastern Ontario, Ottawa, Ontario

The experience in the Preassessment clinics as well as much of the Obstetrics rotations will occur throughout the PGY2 to PGY5 years. The CHEO rotation will be three months long. This block may be taken at some other suitable Paediatric Hospital if initiated by the resident and approved by the program director. KGH CP (Chronic Pain) will be a 2 month block of time.

Unless stated in the block objectives specifically, the following objectives are those within the MEDICAL EXPERT role in the CanMEDS 2000 competencies. The other competencies are outlined in Section I: Goals of the Anesthesiology Residency Program, pp. 1-4.
KGH
Introductory Anesthesia Objectives

During the first two months of anesthesia training at the PGY2 level, residents will begin their formal training in perioperative care. By the end of these two months of training, the resident should be competent to take call on their own, without the benefit of having a senior resident on call with them (the buddy system). In order to attain this goal, the following knowledge and skill objectives should be attained.

Preoperative assessment

**MEDICAL EXPERT**
The resident will be able to:

1. complete an appropriate history and physical exam,
2. correctly assign an ASA score to the patient.
3. demonstrate an adequate knowledge of the action, dose and problems associated with drugs commonly used in the resident’s anesthetic practice. This will be similar to that knowledge required in the undergraduate course of medical pharmacology. Included should be: an induction agent, a volatile anesthetic, a narcotic and antagonist, muscle relaxants (Succinylcholine and a non-depolarizing relaxant) and an antagonist, a local anesthetic drug, and those drugs required for resuscitation (to the level of ACLS).
4. demonstrate some knowledge of the interaction of the above drugs with other medications and with common patient problems and co-morbidities.
5. demonstrate some knowledge of the limitations of various basic monitoring equipment, and be able to select appropriate monitors for the patient’s intra-operative course.
6. demonstrate a basic ability to assess a patient’s airway, breathing, and cardiovascular system, during the pre-anesthetic, anesthetic, and post anesthetic periods.
7. demonstrate the ability to perform a satisfactory machine check.
8. formulate a plan of anesthesia demonstrating the beginning of integration of patient assessment with the requirements of the surgical procedure and the anesthetic drugs.
9. demonstrate the ability to place an IV satisfactorily (more often than not).
10. be expected to know how to perform central venous cannulation and intra-arterial cannulation but not to have perfected these skills.
11. demonstrate the ability to maintain an airway with either mask or endotracheal tube most of the time; and to recognize problems that may occur with the airway
12. perform a subarachnoid or an epidural puncture for the purposes of anesthesia.
13. demonstrate the ability to perform without assistance:
   - straightforward spinal, epidural or general anesthetics for ASA I and II patients,
   - epidural anesthesia for normal labor and delivery (following an appropriate clinical experience), with a success rate @ 70% by the end of their introductory first month and 90% by the end of their second month, with no more than 3 PDPH’s
   - adult and neonatal resuscitation (following an appropriate clinical experience).

**COMMUNICATOR**
The resident will be able to:

1. effectively communicate with patients to elicit an appropriate history
2. let patients know of risks and benefits of various techniques used
3. treat patients with respect and courtesy in answering all questions and concerns they may have
4. effectively communicate with other members of the operating room in order to voice issues and concerns
COLLABORATOR
The resident should be proficient at:
1. consulting with other physicians when appropriate
2. working together with other health care professionals to ensure smooth patient care and safety
3. recognizing the intricate nature in which a surgeon and anesthesiologist must work together for the patient’s benefit

MANAGER
1. Residents will start to manage their operating room ie: ensure necessary equipment and medications are available and have their room set up in the fashion so that they will be ready to deal with the unexpected

HEALTH ADVOCATE
Residents will begin to understand the utilization and allocation of finite health care resources

SCHOLAR
The resident will
2. demonstrate on going self directed learning
3. begin to understand the notion of evidence based practice
4. develop a basic understanding of research methodology
5. come to the operating room each morning having read up on the cases for the day, and having reviewed the charts (or seen the patients)

PROFESSIONAL
The resident will:
1. demonstrate a sense of responsibility toward their patients
2. work hard at developing a respectful doctor-patient relationship in the limited time available
3. demonstrate on going self-assessment and insight
4. begin to learn how to perform appropriately under stressful situations
5. be aware of his/her own limitations at all times and ask for help/supervision appropriately

At this stage both direction and intervention by the staff are expected as part of the normal teaching and learning experience.

References

Evaluation:
Daily evaluation summaries

Block Coordinator
Dr. Melanie Jaeger
revised September 2004
KGH
Cardiac Anesthesiology Rotation Objectives

GENERAL OBJECTIVES:
Residents completing a full program will have the expertise to manage all aspects of anesthetic care in a patient with cardiac disease(s) presenting for cardiac surgery, cardiac interventions (in cardiac catheterization lab, CCU, EP lab) or non-cardiac surgery and non-cardiac interventions. They will serve as anesthesiology medical consultants to other medical specialists. Residents may use this rotation to decide if they wish to pursue fellowship training in cardiac anesthesiology and transesophageal echocardiography. Family practice Anesthesiology residents and off-service residents will have limited well-defined objectives.

SPECIFIC OBJECTIVES:
A series of core topics on cardiac physiology and pathology as it applies to clinical anesthesia are taught in a didactic and interactive format (see core program topics) by clinical anesthesiology and cardiology faculty. The principals learnt at core serves as the basis of clinical rotation. After completion of didactic and clinical portions of this rotation residents should be well prepared to answer written and oral cardiac questions at The Royal College specialists examination in anesthesiology.

CLINICAL FACULTY:
- Cardiac Anesthesiologists and Intensivists
- Cardiac Surgeons
- Clinical Perfusionists

ORGANIZATION OF THE ROTATION:
There are two separate clinical rotation:
1. A one-month junior resident rotation block at PGY2 or 3 level.
2. A one to two month block for senior residents at PGY4 or PGY5 level.

RESIDENT ROTATION - TEACHING TECHNIQUES:
At junior level clinical teaching and learning is focused, directive and goal oriented. Residents are taught technical skills and encouraged to develop in depth understanding of topics (listed) that will help them with Clinical Decisions in cardiac anesthesiology and in patients with cardiac disease coming for non-cardiac surgery. At senior level residents assume graded increase in responsibilities to become independent practitioners. Emphasis is on self-directed learning of key topics with faculty acting as a resource.

RESIDENT AS A CLINICAL DECISION MAKER/ANESTHESIOLOGY MEDICAL EXPERT
Skill sets and topics:

Topics start from basic, taught at the junior level, to more advanced, taught at the senior level

A. Physiology and Anatomy
   The resident is expected to:
   - Describe detailed coronary anatomy, physiology and its relevance to ischemia
   - Know important aspects of the anatomy and physiology of cardiac valves, left ventricle, right ventricle (ex: determinants of cardiac output, autoregulation), circulatory system, aorta and pulmonary circulation
   - Know about normal and abnormal conduction pathways and its clinical significance
   - Be familiar with relevant embryology and physiology as it applies to adult congenital heart disease (also see Pediatrics for CHD)
B. **Pharmacology**
   The resident should know:
   - Commonly used cardiac drugs, Heparin, thrombolytics, antiplatelet agents its dosages and its anesthetic implications
   - Anti-fibrinolytic agents and its mechanism of action
   - Cardiovascular effects of volatile and intravenous anesthetic agents.
   - Commonly used vasodilators, vasoconstrictors, inotropic and lusitropic agents, their dosages and effects.
   - Commonly used anti-arrhythmic agents (ex: Procainamide, Amiodarone etc)

C. **Monitoring**
   The resident will be able to:
   - Interpret EKG for ischemia, infarction and arrhythmia. They will know relevance of special lead placement. They will recognize its limitation, sensitivity/specificity of EKG as ischemia monitor.
   - Demonstrate principals of non-invasive and invasive BP monitoring and its pitfalls
   - Acquire skills of arterial and central venous cannulation, PA catheterization; interpret CVP and data from PA catheter (PAP, PCWP, Cardiac output) and know its indications, complications and management.
   - Know basics of introductory TEE during senior rotation (see also CVRI objectives)
   - Laboratory monitoring of the coagulation system as applied to cardiac surgery

D. **Clinical Assessment**
   The resident will learn focused history, physical examination and laboratory data. By their senior years they will be able to evaluate cardiac catheterization, echocardiography and other data to arrive at relevant anesthetic consideration and risks.

E. **Clinical Management**
   The resident will be able to:
   - Optimize the patients pre-operatively with medications (ex: β-blockers, SBE prophylaxis, anticoagulation etc)
   - Know current indications and recommendations for SBE prophylaxis
   - Know detailed pathophysiology, anesthetic considerations (of cardiac surgery and non-cardiac surgery or procedures) and management of patients with:
     1) Coronary artery disease, acute myocardial ischemia and infarction, complications of myocardial infarction and thrombolytic therapy
     2) Coronary Surgery without cardiopulmonary bypass (Off-Pump)
     3) valvular heart disease and valve replacement or repair
     4) Cardiac tamponade, constrictive pericarditis
     5) Dilated, restrictive and obstructive cardiomyopathy (IHSS), CHF, and diastolic dysfunction
     6) Aberrant conduction (ex: WPW), dysrhythmia, Ablation procedures (EP lab)
     7) Pacemaker, Implantable Cardioverter Defibrillator (ICD)
     8) Aortic Dissection, Thoracic and Thoraco-Abdominal Aortic Aneurysm
     9) Cardiac tumours
     10) Urgent and non-urgent Cardiac re-operation
     11) Heart transplant patients coming for non-cardiac surgery (see also transplant block)
     12) Heparin induced thrombocytopenia and heparin resistance
     13) Sudden acute and sub-acute ventricular and supra-ventricular arrhythmia
   - Know pathophysiology and management of complications after cardiac surgery:
     ex bleeding, graft occlusion, early and late arrhythmia, stroke etc
   - Discuss management of shock
   - Discuss ACLS,CPR
F. Knowledge of special issues related to cardiac surgery and Anesthesiology

- Fast-track Cardiac Anesthesia and Surgery
- Neuro-cognitive dysfunction
- Antifibrinolytics and its role in blood conservation
- Circulatory Arrest
- IABP
- CPB and related issues
- Cardioplegia
- Left and Right ventricular assist devices, Bi-VAD and artificial heart
- Heart and Heart Lung transplantation
- New and novel anticoagulants (ex: recombinant Hirudin). New coagulation reversal agents (ex: Heparinase)
- Methods of blood conservation in cardiac surgery. Blood substitute
- Resource utilization and cost effective techniques in cardiac anesthesiology, surgery and CV intensive care (see CVRI block objectives)

RESIDENT AS AN EFFECTIVE COMMUNICATOR

At the senior level resident will be encouraged to develop their unique style as a communicator.

Effective communication skills will be taught and encouraged at several levels:

- Between Resident Physician and Patient (client) and her/his family
  - Obtaining accurate and relevant history and perform detail physical examination using effective listening skills
  - Explain anesthetic procedures (central line, intubation, TEE etc) in a clear and a compassionate manner
  - Outline risks and obtain informed consent
- Between Resident and the Cardiac Anesthesiology Attending
  - Communicate patient information and outline anesthetic management plan to the attending in a professional and intelligent manner
- Between Resident and OR Personnel
  - Discuss special needs (monitoring etc) with nurses, perfusionists and OR personal in a respectful manner
  - Ensure clear and audible communication with Perfusionist, Surgeon, and Nurses to ensure safety and prevent errors (drugs, positioning etc)
- Between Resident and the Surgeon
  - Outline anesthetic concerns to the surgeon especially if it involves a high risk patient, cancellation or postponement of the surgery pending further investigation

COLLABORATIVE ROLE OF A RESIDENT PHYSICIAN

Residents are expected to learn this role in several areas and become increasingly comfortable with it in their senior years:

- Recognize their limitations and seek consultation from medical experts in other disciplines
- Learn how to advise other physicians in an oral and a well-written (consult note) format on cardiac anesthetic issues in which the resident has developed expertise. They are expected to discuss each consult with the attending.
- Foster healthy team relationships (ex: refrain from blaming or denigrating others)
RESIDENT PHYSICIAN MANAGER

Residents are taught:

- Collaborative Care Plans and Fast-track cardiac anesthesiology and surgery in resource optimization
- Time efficiency in cardiac anesthetic procedures and its impact on the rest of the OR
- To anticipate post-operative needs of the patient and arranging for it (step-down, ICU, CVICU)

RESIDENT AS THE HEALTH ADVOCATE

Health Advocacy requires clinical experience at an advanced level. Senior residents will learn from staff in action in this area. Resident will learn:

- The impact of collaborative care plan, CVICU management, pre-operative assessment clinic in reducing patient’s wait time for cardiac surgery and morbidity as a result
- How intra-operative TEE drastically alters surgical decision leading to long term and short term health of the patient ex: Mitral valve repair in place of replacement
- The importance of pain management, arrhythmia prophylaxis etc on hospital length of stay
- Participate from cardiac anesthesiology point of view in emerging cardiac surgical and interventional techniques

SCHOLAR

Residents will be encouraged to develop scholarship in several areas:

- Develop skills as an educator scholar teaching junior residents and medical students in the OR under supervision of staff about clinical problems.
- Critical Enquiry of a clinical question that they have raised or appeared during teaching discussion with the consultant cardiac anesthesiologists. Resident may write a case report of an unusual problem and publish it with staff supervision. There are on going research projects in cardiac anesthesiology that residents are encouraged to participate in. There is mentorship program that resident can use to research a clinical question with aid available for grant writing and submission
- Clinician Scholar. Training and exposure is available to residents in TEE from the basic to more advanced level. The aim is to attract residents to become outstanding clinicians using TEE in their clinical anesthesiology practice. All seniors are introduced to TEE. If residents are interested beyond the introductory level then they are allowed a longer rotation on Peri-Operative TEE service by prior arrangement with the program director.

PROFESSIONALISM IN RESIDENT PHYSICIANS

Residents must:

- Always demonstrate respectful, compassionate behavior toward patients, their families and other health care providers
- Demonstrate an appropriate sense of responsibility for their patients
- Strive to maintain insight and self-assessment regarding their own behavior
- Remain calm and organized in stressful, emergency situations

EVALUATION

Daily evaluation of both residents and faculty to be filled out by attending and the residents. One to one interview with the block co-ordinator at the end of the rotation. Resident feedback will be used to improve teaching techniques.
Queen’s Cardiac Anesthesiology/TEE Resident Handbook

Resident handbook will be developed to address key topics, provide references to landmark articles, and elaborate on protocols. It will serve as reference for residents and staff and provide list of topics for discussion in clinical setting. Core topics missed by residents can be referred to in this manual.

Block Coordinator – Cardiac

Dr. M.J. Ali

Reviewed September 2004
Cardiovascular Intensive Care Unit (CVRI) Rotation Objectives

MEDICAL EXPERT

Residents completing a one month rotation in the Cardiovascular Recovery and Intensive Care Unit (CVRI) should achieve competence in the management of routine postoperative care of Coronary Bypass Graft patients, Valve replacement and/or repair (aortic, mitral) as well as patients undergoing major vascular surgery such as Abdominal and Thoracic Aortic Aneurysm Repair and Aortobifemoral Grafting Procedures. The resident will also gain preliminary exposure to the role of perioperative echocardiography in the management of cardiac surgical patients in the OR and ICU setting.

RESIDENT AS A CLINICAL DECISION MAKER/ANESTHESIOLOGY MEDICAL EXPERT

Demonstrate knowledge of the basic sciences as applied to the critical postoperative period after CABG, valve replacement and/or repair, and major vascular patients

G. Physiology and Anatomy

The resident is expected to:

- Describe detailed coronary anatomy, physiology and its relevance to ischemia
- Know important aspects of the anatomy and physiology of cardiac valves, left ventricle, right ventricle (ex: determinants of cardiac output, autoregulation), circulatory system, aorta and pulmonary circulation
- Know about normal and abnormal conduction pathways and its clinical significance
- Be familiar with relevant embryology and physiology as it applies to adult congenital heart disease (also see Pediatrics for CHD)
- Describe the altered respiratory physiology of the immediately postoperative ventilated patient with significant surgical incisions and pain (sternotomy, large abdominal incision
- Understand the pathophysiology of aneurysmal development and peripheral vascular disease

H. Pharmacology

The resident should know:

- Commonly used cardiac drugs, Heparin, thrombolytics, antiplatelet agents its dosages and its anesthetic implications
- Anti-fibrinolytic agents and its mechanism of action
- The use of blood products (PRBC, FFP, platelets, cryoprecipitate) and blood alternatives (albumin, pentastarch) as well as transfusion reactions and complications.
- Coagulation drugs currently available (DDAVP, activated factor 7a, protamine) their indications, contraindications, dosages and complications
- Cardiovascular and respiratory effects of intravenous anesthetics and benzodiazepines (propofol infusions, midazolam)
- Commonly used vasodilators, vasoconstrictors, inotropic and lusitropic agents, their dosages and effects.
- Commonly used anti-arrhythmic agents (ex: Procainamide, Amiodarone, sotalol etc) for prophylaxis and treatment of post operative atrial fibrillation, SVT and ventricular arrhythmias
- The use of neuromuscular blockage reversal agents in conjunction with anticholinergic drugs, and their complications (neostigmine, edrophonium, glycopyrrolate, atropine)
- The appropriate use of pain medications and regional anesthetic techniques in the ventilated patient
I. Monitoring
   The resident will be able to:
   - Interpret EKG for ischemia, infarction, arrhythmia and paced rhythms. They will know relevance of special lead placement. They will recognize its limitation, sensitivity/specificity of EKG as ischemia monitor.
   - Demonstrate principals of non-invasive and invasive BP monitoring and its pitfalls
   - Acquire skills of arterial and central venous cannulation, peripheral venous cannulation, rewiring central venous access, PA catheterization; interpret CVP and data from PA catheter (PAP, PCWP, Cardiac output) and know its indications, complications and management.
   - Know basics of introductory TEE and its application to the critical care patient
   - Laboratory monitoring of the coagulation system as applied to the postoperative cardiac or vascular patient
   - Ability to assess the adequacy of mechanical ventilation using clinical parameters (pt size & weight, peak & plateau ventilatory pressures, mode of ventilation in conjunction with patient LOC, tidal volume, rate) and laboratory arterial blood gas analysis
   - Recognize the parameters used to assess postoperative blood loss
   - Know the significance of temperatures postoperatively in cardiac and vascular patients
   - Appreciate the indicators of volume status in the special circumstances of post operative cardiac and major vascular patients
   - Utilize appropriate ICU bloodwork for the management of patient care

J. Clinical Assessment & Management
   The resident will be able to:
   - Complete a detailed history, physical exam, order appropriate laboratory and ancillary investigations and provide a management plan for a patient admitted to the CVRI
   - Know current indications and recommendations for SBE prophylaxis
   - Manage the medical and the first stages of surgical postoperative bleeding
   - Identify criteria for intubation, extubation. Be able to wean patients from the ventilator adjusting the modes of ventilatory support.
   - Correct common derraangement in metabolic and electrolyte disturbances in the postoperative cardiac and vascular patient
   - Know the common pathophysiology and management of patients admitted to a cardiac critical care setting with complications of:
     14) Coronary artery disease, acute myocardial ischemia and infarction, complications of myocardial infarction and thrombolytic therapy
     15) Valvular heart disease and valve replacement or repair
     16) Shock and the use of volume resuscitation, venodilators/constrictors, ionotropes and lusiotropes
     17) Emergencies requiring ACLS
     18) Cardiac tamponade, constrictive pericarditis
     19) Dilated, restrictive and obstructive cardiomyopathy (IHSS), CHF, and diastolic dysfunction
     20) Aberrant conduction, dysrhythmia, sudden acute and sub-acute ventricular and supra-ventricular arrhythmia
     21) Pacemakers & the indications for and applications of the various modes of temporary pacing
     22) Aortic Dissection, Thoracic and Thoraco-Abdominal Aortic Aneurysm
     23) Pneumothorax
     24) Pulmonary edema
     25) COPD, asthma, sleep apnea in the ventilated patient
     26) Ventilated patients
     27) Heparin induced thrombocytopenia and heparin resistance
28) Neurologic sequelae post CPB procedures
29) Gastrointestinal complications following major vascular patients
30) Diabetes and endocrine control

RESIDENT AS AN EFFECTIVE COMMUNICATOR

At the senior level resident will be encouraged to develop their unique style as a communicator. **Effective communication skills will be taught and encouraged at several levels:**

- Between Resident Physician and Patient (client) and her/his family
  - Obtaining accurate and relevant history and perform detail physical examination using effective listening skills
  - Explain the status of the patient and expected progress of the critical care patient to his/her family
  - Effectively communicate to a ventilated patient or a sedated patient
- Between Resident and the CVRI Attending/TEE Attending
  - Communicate patient information and outline management plan to the attending in a professional and intelligent manner
- Between Resident and Critical Care Team (ICU nurse, RT, ward clerk)
  - Communicate management plan effectively in a routine and emergency situation
- Between Resident and the Surgeon, Pain Specialist, other Specialist
  - Discuss the clinical parameters of possible surgical re-exploration in a calm and intelligent manner
  - Discuss implications of epidural or other regional techniques in the postop critical care patient
  - Receptive to differing opinions on management decisions

COLLABORATIVE ROLE OF A RESIDENT PHYSICIAN

Recognize the need to utilize other specialists for the care and management of the critical patient:

- Differentiate the critical differences between medical and surgical postoperative bleeding and collaborate with the surgical specialty
- Recognize the signs of compromised GI perfusion and facilitate interactions with the vascular surgeon and general surgeon
- Consultations with nephrology regarding common complications of post cardiac patients ARF/CRF and other subspecialists
- Learn how to advise other physicians in an oral and a well-written format on critical care issues.
- Foster healthy team relationships (ex: refrain from blaming or denigrating others)

RESIDENT PHYSICIAN MANAGER

Residents are taught:

- Collaborative Care Plans and Fast-track cardiac anesthesiology and surgery in resource optimization
- Time management in co-ordinating discharge with scheduled surgical admissions and the impact of cancellations of the surgical patient due to limit resources on the patient and family, waiting list, human resource allocations
- To anticipate post CVRI needs of the patient and arranging for it (step-down, telemetry, ICU)

RESIDENT AS THE HEALTH ADVOCATE

Health Advocacy requires clinical experience at an advanced level. Senior residents will learn from staff in action in this area. Resident will learn:
• The impact of collaborative care plan: CVICU management in conjunction with surgical, ICU and ward medicine can facilitate patient care
• The importance of pain management, arrhythmia prophylaxis etc on hospital length of stay

RESIDENT AS THE SCHOLAR

Residents will be encouraged to develop scholarship in several areas:

• Identify important determinants during the CVRI admission that impact the health and success of the fast-track cardiac patient
• Identify areas of controversy in the management of critical care patients using clinical observations, literature reviews and seek to practice evidence based medicine
• Contribute to the medical education of other health professionals (clerks, nurses in training, RTs in training etc.)
• Develop an educational pattern of self study and critical appraisal of the resident’s own performance and knowledge
• Training and exposure is available to residents in TEE from the basic to more advanced level. The aim is to attract residents to become outstanding clinicians using TEE in their clinical anesthesiology practice. All seniors are introduced to TEE. If residents are interested beyond the introductory level then they are allowed a longer rotation on Peri-Operative TEE service by prior arrangement with the program director.

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Resident handbook will be developed to address key topics, provide references to landmark articles, and elaborate on protocols. It will serve as reference for residents and staff and provide list of topics for discussion in clinical setting. Core topics missed by residents can be referred to in this manual.

Dr. Melinda L. Fleming
Coordinator
Revised September 2004
KGH
Vascular Anesthesia Objectives

At the completion of training, the resident will have acquired the following competencies and will function effectively as:

**MEDICAL EXPERT/CLINICAL DECISION-MAKER**

*General Requirements*

- Demonstrate diagnostic and therapeutic skills for ethical and effective patient care.
- Access and apply relevant information to clinical practice.
- Demonstrate effective consultation services with respect to patient care, education and legal opinions.

*Specific Requirements*

- Demonstrate knowledge of the basic sciences as applicable to anesthesia, including vascular anatomy, vascular supply of major organs, and pertinent physiology and pharmacology related to vascular surgical procedures.
- Demonstrate knowledge of general internal medicine with particular reference to the cardiovascular, respiratory and coagulation systems.
- Demonstrate knowledge of the pharmacology of vasoactive and inotropic drugs used in high-risk surgical and critical care situations, and of beta blockers and alpha-2 agonists in these patients.
- Demonstrate knowledge of the common co-existing diseases in vascular patients, and ways of optimizing these patients for surgery.
- Demonstrate the ability to use current clinical guidelines for preoperative assessment of patients with cardiovascular diseases undergoing non-cardiac procedures.
- Demonstrate knowledge of the physiology of aortic cross-clamping and unclamping, and management strategies to deal with these events.
- Demonstrate knowledge of the benefits and risks of the use of regional anesthesia/analgesia in vascular procedures.
- Demonstrate clinical skills necessary to general internal medicine and intensive care including the ability to investigate, diagnose, and manage appropriately factors that influence a patient's medical and surgical care.
- Demonstrate clinical skills necessary for the independent practice of anesthesia, including preoperative assessment, intraoperative support and postoperative management of adult patients of any physical status, with diverse coexisting diseases, for aortic, peripheral vascular and carotid procedures.
- Demonstrate knowledge and clinical skills related to the monitoring and interpretation of monitoring for aortic and carotid vascular procedures, including their indications and complications.
o Demonstrate clinical skills necessary to the management of emergent vascular procedures, including resuscitation and management of ruptured aortic aneurysm.

o Demonstrate knowledge and management of important complications which may occur following the various vascular procedures.

o Demonstrate clinical skills necessary for basic resuscitation and life support as practiced in critical care facilities.

o Demonstrate competence in all technical procedures commonly employed in vascular anesthetic procedures, including airway management, cardiovascular resuscitation, patient monitoring and life support, general, and regional anesthetic and analgesic techniques and postoperative care.

o Demonstrate knowledge of the principles of management of patients with postoperative pain following abdominal and peripheral vascular procedures, and chronic pain in patients with chronic vascular insufficiency.

o Demonstrate knowledge of basic legal and bioethical issues encountered in anesthetic practice including informed consent for anesthetic and monitoring procedures, and blood transfusion.

COMMUNICATOR

General Requirements

o Establish a professional relationship with patients and families.

o Obtain and collate relevant history from patients, and families.

o Listen effectively.

o Discuss appropriate information with patients and families and other members of the health care team.

Specific Requirements

o Demonstrate consideration and compassion in communicating with patients and families.

o Provide accurate information with regard to anesthetic options and risks.

o Communicate effectively with medical colleagues, nurses, and paramedical personnel in inpatient, outpatient, and operating room environments.

o Demonstrate appropriate oral and written communication skills.

o Ensure adequate information has been provided to the patient prior to undertaking invasive procedures.

COLLABORATOR

General Requirements

o Consult effectively with other physicians and health care professionals, in particular vascular surgeons and physicians involved in preoperative assessment and postoperative management.

o Contribute effectively to other interdisciplinary team activities.

Specific Requirements
Demonstrate ability to function in the clinical environment using the full abilities of all team members.

**MANAGER**

*General Requirements*

- Utilize personal resources effectively in order to balance patient care, continuing education, and personal activities.
- Allocate finite health care resources wisely.
- Work effectively and efficiently in a health care organization.
- Utilize information technology to optimize patient care, and life long learning.

*Specific Requirements*

- Demonstrate knowledge of the contributors to anesthetic expenditures.
- Demonstrate knowledge of the guidelines concerning anesthetic practice and equipment in Canada.
- Record appropriate information for anesthetics and consultations provided.

**SCHOLAR**

*General Requirements*

- Be aware of the literature pertaining to vascular anesthesia, and critically appraise sources of medical information.

*Specific Requirements*

- Critically assess the literature using established criteria.
- Describe the principles of research relevant to this population.

**PROFESSIONAL**

*General Requirements*

- Deliver highest quality care with integrity, honesty and compassion.
- Exhibit appropriate personal and interpersonal professional behaviours.
- Practice medicine ethically consistent with the obligations of a physician.

*Specific Requirements*

- Include the patient in discussions concerning appropriate diagnostic and management procedures.
- Respect the opinions of fellow consultants and referring physicians in the management of patient problems and be willing to provide means whereby differences of opinion can be discussed and resolved.
- Show recognition of limits of personal skill and knowledge by appropriately consulting other physicians and paramedical personnel when caring for the patient.

Block Coordinator - Dr. J. Parlow
Reviewed September 2004


**KGH**

**Thoracic Anesthesia Objectives**

<table>
<thead>
<tr>
<th>CANMeds Role</th>
<th>KEY COMPETENCIES FOR THORACIC ROTATION</th>
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| MEDICAL EXPERT     | □ Gain experience in pre-op assessment and optimization of thoracic patients, including evaluation of operability  
                      □ Describe anesthetic considerations for specific respiratory diseases (Obstructive and restrictive lung disease, Pulmonary hypertension, Pneumothorax, Mediastinal mass, Bullous lung disease, Bronchopleural fistula, Pulmonary hemorrhage, Lung Abscess, Superior Vena Cava Syndrome)  
                      □ Describe anesthetic considerations for routine thoracic procedures (Flexible and Rigid Bronchoscopy, Mediastinoscopy, Thoracoscopy, Lobectomy, Pneumonectomy, Esophagectomy, Esophagoscopy +/- dilatation)  
                      □ Develop an approach to more complex problems in thoracic anesthesia (Tracheal resection, Sleeve resection, Airway laser surgery, Retrieval of foreign body in airway, Massive Pulmonary Hemorrhage)  
                      □ Demonstrate thoracic anesthesia knowledge and skill in the following areas: indications and techniques for lung isolation including double lumen endotracheal tubes and bronchial blockers, lung isolation in the patient with a difficult airway, physiology of lateral position and open thorax, approach to hypoxia on one lung ventilation, fiberoptic bronchoscopy  
                      □ Demonstrate knowledge and skill required for appropriate intra-op monitoring (spirometry, arterial line, central line)  
                      □ Demonstrate knowledge and skill in provision of post-op analgesia (thoracic epidural, paravertebral and intercostals blocks)  
                      □ Develop an approach to post-op management of thoracic patients and their unique complications (i.e. post-pneumonectomy pulmonary edema, cardiac herniation)  
| COMMUNICATOR       | □ Demonstrate effective communication with patient (description of procedures, informed consent)  
                      □ Demonstrate effective communication with OR team (thoracic surgeons and nurses) and post-op team (ICU, PACU)  
                      □ Provide clear and concise written consultations and anesthetic records  
| COLLABORATOR       | □ Seek peri-op consultation with colleagues when required  
                      □ Manage OR time by efficiently conducting the anesthetic  
                      □ Provide patient advocacy for various peri-operative issues (i.e. patient safety, analgesia, post-op monitoring)  
| MANAGER            | □ Demonstrate commitment to continuing personal education  
                      □ Be able to critically review thoracic anesthesia literature  
                      □ Assist in education of other members of OR team  
| HEALTH ADVOCATE    | □ Demonstrate a sense of responsibility, integrity, honesty and compassion when caring for patients  
                      □ Demonstrate respect for patients and colleagues  
| SCHOLAR            | □ Be able to critically review thoracic anesthesia literature  
| PROFESSIONAL       | □ Assist in education of other members of OR team  

**TEXTBOOK REFERENCES:**

Block coordinator – Thoracic
Dr. Kim E. Turner
Reviewed September 2004
KGH:
Neuroanesthesia/Neurosciences Objectives

Introduction:

The resident can read ahead of the rotation to gain familiarity with this material prior to beginning the rotation in neuroanesthesia. Most of the required information is contained in any of the standard textbooks of anesthesia. Basic science objectives are covered in detail in Section III. In general, topics include:

a. Basic neurophysiology, including an understanding of the synapse, the neuromuscular junction and the action of anesthetics.
b. Determinants of cerebral blood flow including the effect of anesthetic agents, both intravenous and inhalational, on normal cerebral metabolism and cerebral blood flow.
c. Arterial and venous anatomy of the brain and the spinal cord; and the production and absorption of CSF.
d. The responses of the brain to injury and strategies for cerebral protection.

Objectives:

MEDICAL EXPERT

The general anesthetic considerations for neurosurgical patients are no different than any other group of patients coming for anesthesia. However, understanding how neurological disease may impact on our anesthetic practice will make neuroanesthesia more interesting and fulfilling.

The resident will be able to:
1. appropriately assess the neurosurgical patient preoperatively
2. choose the appropriate monitoring for neurosurgery including special monitors for venous air embolism, EEG analysis, evoked potentials
3. discuss the principles of fluid balance in neurosurgery
4. discuss the methods of monitoring ICP.
5. be able to describe the factors that are important in the maintenance of cerebral perfusion/pressure.
6. describe the effects of patient positioning in neuroanesthesia.
7. describe the importance of temperature regulation, in particular the effects of hypothermia
8. demonstrate how to make the transition from the OR to the PAR setting

Specific topics in neurosurgery/neuroanesthesia:

Residents will be able to discuss in detail the following topics:

1. Head injury--how can we limit or exacerbate the extent of neurological damage?
2. Space occupying lesions in the brain.
3. Anesthesia for posterior fossa surgery.
4. Anesthesia for vascular malformations or arterial aneurysms including techniques for induced hypotension.
   o the concept of cerebral vasospasm and its therapy
5. Carotid endarterectomy.
   o general vs. local anesthesia techniques
   o techniques for maintaining cerebral perfusion pressure
7. Pediatric neuroanesthesia.
9. Control of seizures and effects of anticonvulsant medications on anesthesia.
10. Spinal cord injury:
    o anesthetic considerations for:
      • acute injury
11. Anesthesia techniques for awake craniotomy.

12. Pituitary surgery
   - Problems with the transphenoidal approach


14. Cerebrovascular lesions and tumors in the Pregnant patient
   - Monitoring
     - Implications of pregnancy on the anesthesia considerations
       - cardiovascular
       - pulmonary
       - position
       - gastrointestinal
       - fetal considerations

15. Topics in neurosurgical intensive care.
   - maintenance of ICP control
     - monitoring ICP
   - Respiratory care
   - Cardiovascular issues
     - fluid management

**COMMUNICATOR**

Residents will be able to:
1. Communicate effectively with patients to elicit all necessary information
2. Communicate and empathize with patients in order to relieve their anxiety, answer all questions and agree upon a course of action that is acceptable to all involved
3. Chart appropriately, legibly and clearly
4. Effectively communicate with other professionals in order to manage patients
5. Offer advice and management plans when asked to consult on a patient from another service

**COLLABORATOR**

Residents will effectively and respectfully:
1. Collaborate with other services, particularly ICU and NCCU regarding pre- and post-operative care of patients
2. Review management plans and courses of action with the surgeons at all times
3. Consider advice from allied health professionals
4. Work with the operating room team in a positive manner

**MANAGER**

6. Residents will manage their operating room i.e.: ensure necessary equipment and medications are available and have their room set up in the fashion so that they will be ready to deal with the unexpected
7. Residents will start to become proactive in ensuring appropriate post-operative placement for their patients, i.e. ICU bed, step down bed, etc

**HEALTH ADVOCATE**

Residents will acknowledge the difficulties and decision-making involved in utilization and allocation of finite health care resources

**SCHOLAR**

The resident will:
1. demonstrate on going self-directed learning
2. understand the notion of evidence based practice
3. develop a working understanding of research methodology
4. come to the operating room each morning having read up on the cases for the day, and having reviewed the charts (or seen the patients)
5. follow up their patients the following day to ensure that unforeseen complications are addressed

**PROFESSIONAL**

The resident will:
6. demonstrate a sense of responsibility toward their patients
7. develop a respectful doctor-patient relationship in the limited time available
8. demonstrate ongoing self-assessment and insight
9. perform appropriately under stressful situations
10. be aware of his/her own limitations at all times and ask for help/supervision appropriately

**References:**
1. Miller’s Anesthesia, 6th Edition, 2005; Ch 21, Cerebral Physiology and the effects of Anesthetics and Techniques, p 813-44; Ch 22, Neuromuscular Physiology and Pharmacology, p 859-77; Ch 53, Neurosurgical Anesthesia, p 2127-65.


4. Anesthesia and Neurosurgery, 2001, Cottrell and Smith, Mosby

**Evaluation:**
The resident will receive daily evaluations which will be reviewed by the Program Director and incorporated into their ITER.

Neuroanesthesia Block Coordinator
**Dr Brian Simchison**
*revised November 2007*
KGH
Obstetrical Anesthesia Objectives

Introduction:
Residents will spend one month on the Obstetrics rotation as a junior resident and one month as a senior resident. As well, they will be exposed to Labour and Delivery Anesthesia throughout the residency when they are on call. Throughout the residency, they are expected to attain the following objectives by reading and with discussion with the faculty. Residents are expected to be familiar with the objectives listed in the Clinical Science Objectives portion of this manual.

OBJECTIVES

MEDICAL EXPERT

PGY2 and PGY3 Year
1. Manual skills development:
   • Epidural catheter placement with a success rate @ 70% by the end of their introductory first month and 90% by the end of their second month, with no more than 3 PDPH’s;
   • SAB placement (success rate @80%) by the end of the second month, with >90% success for the remainder of the program.

2. Obstetric Physiology
   A. Know the relevant maternal and fetal physiological changes that occur with pregnancy such that residents will be able to select and perform the appropriate labour analgesia. This will include both pharmacologic and non-pharmacologic options.
   B. Residents will be familiar with and able to manage labour analgesia/anesthesia in hypertensive obstetric patients no matter what the cause of the hypertension.
   C. Residents will be familiar with the indications, contraindications, and techniques of SAB, epidural, and other regional anaesthesia techniques for labour and delivery, and for problems post delivery such as retained products of conception.
   D. Residents will be able to appropriately initiate and maintain a patient with a general anaesthetic for a Cesarean Section.
   E. The resident will know the anesthetic implications of:
      • ectopic pregnancy,
      • abruptio placenta,
      • placenta previa,
      • uterine atony,
      • uterine laceration/rupture,
      • retained placenta,
      • inverted uterus.
   F. Discuss anaesthetic considerations including volume replacement, coagulation disorder, and double setup/anaesthesia management.
   G. The resident will be able to perform a neonatal resuscitation consistent with the NRP protocol.
   H. The resident will know the main complications of anesthesia during pregnancy and take appropriate steps to minimize the risk to the patient.
   I. Anesthetic Management of Non-Obstetric Surgery During Pregnancy
      • Describe advantages and disadvantages of performing elective operations during the first, second and third trimesters of pregnancy?
      • Explain precautions that should be taken in each trimester?
      • When is FHR monitoring indicated? Describe management options when intraoperative FHR monitoring shows fetal bradycardia or decreased FHR variability.
- Describe special anesthetic considerations in parturients who undergo trauma or emergency operations.
- Discuss effects of maternal hypotension, hyperventilation, hypoventilation, blood transfusion on the fetus well being.

**PGY4 and PGY5**

1. **Manual skills development:**
   Goal: to master skills, with an emphasis on efficiency. Demonstrate mastery of month 1 skills by:
   - Epidural catheter placement:
     - most completed in less than 15 min
     - low epidural replacement rate
     - low rate of PDPH
     - high patient satisfaction rate
     - 80% success rate
   - SAB placement
     - time target 5 minutes
       - success rate more than 90%
       - Performing difficult cases (including high risk parturients)
       - Learn to perform CSE
       - Will be familiar with a technique to establish an epidural blood patch.

2. **Anesthetic and Obstetric Management of High-Risk Pregnancy.**
   A. For each of the following disease categories:
      1. List common obstetric concerns and standard management strategies
      2. Describe anesthetic implications of the disease or condition, focusing on maternal and fetal considerations
      3. Describe how to assess the severity of the disease and how to determine when a patient's condition warrants ICU care
      4. Describe the anesthetic management options for vaginal and cesarean delivery
   - Hypertensive Disorders of Pregnancy
   - Hypertensive disorders other than PET (chronic hypertension)
   - Preeclampsia / eclampsia
   - Multiple gestation
   - Preterm labor
   - Abnormal fetal presentations
   - Antepartum hemorrhage
   - Maternal or fetal infection
   - Endocrine disease
   - Diabetes mellitus
   - Thyroid disease
     - hyperthyroidism
     - hypothyroidism
     - diagnosis and clinical presentation
     - effects of treatment on mother and fetus
   - Substance abuse
     - identify risks and complications;
     - recommend post-operative pain control strategies
     - develop plan to prevent withdrawal complications
     - ethanol abuse (evaluate for related medical disorders)
     - opioid abuse and barbiturate use
     - cocaine abuse
   - Immunological Disease (autoimmune, etc.), including HIV infection
• Neurological disorders (including increase ICP)
  • Multiple sclerosis
    o diagnosis and clinical manifestations
    o effects of pregnancy
• Spinal cord injury
• Myasthenia gravis
• Seizure disorders
• Respiratory disease
• Cardiovascular diseases: For each cardiac condition, one should be able to:
  1. Discuss effect of pregnancy on the cardiac condition;
  2. Explain when invasive monitors are needed for delivery and postpartum care
  3. Provide consultation to obstetricians and patients on the pathophysiology of cardiac lesions
  4. Recommend perioperative management and preferred anesthetic plans for patients with mild to moderate disease
    o Congenital Heart Disease
    o left to right shunt
    o right to left shunts (Tetralogy of Fallot)
    o pulmonary hypertension (Eisenmenger's Syndrome)
    o coarctation of aorta
    o IHSS
    o ischemic Heart Disease
    o Valvular Heart Disease
    o aortic stenosis
    o aortic insufficiency
    o mitral stenosis
    o mitral regurgitation
• Hematological or thromboembolic diseases;
• Morbid obesity
• Systemic or local infection (including viremia, HIV, CMV, sepsis)
• Malignant hyperthermia
• Renal Disease
• Liver Disease
• Musculoskeletal Disorders

B. Pre Labour Clinic
• **Enhanced ability to act as consultant**
  • Formulate anesthesia plans for high risk parturients:
    • prior to onset of labor
    • when patient is admitted to labor floor
    • for problems that arise following delivery of the baby

COMMUNICATOR

Residents are expected to:
• Communicate openly with patients and families regarding anesthetic care
• Communicate effectively with nursing and obstetrical staff regarding management plans
• Ensure neonatology is aware and involved in all levels of decision making where it affects the infant

COLLABORATOR

Residents should:
• Foster healthy relationships with the obstetrical and nursing staff
• Consult other physicians and surgeons when appropriate
• Consult with other allied health care professionals when appropriate
MANAGER

Residents should be adept at balancing the multiple demands placed on the anesthesiologist on the labor and delivery unit and prioritize care and attention effectively

HEALTH ADVOCATE

- Residents should be aware of and always follow the recommended practice guidelines outlined by the CAS and other regulating bodies
- Residents should place the health and well-being of the mother and infant above all else and assume the role of patient advocate if appropriate

SCHOLAR

Residents will:
- Base their management decisions on peer-reviewed literature
- Continue to acquire new knowledge and skills to enhance patient care
- Teach other learners in the environment
- Attend rounds and seminars to enhance their learning

PROFESSIONAL

Residents should:
- Strive to develop insight and self-assessment
- Treat colleagues and patients with respect and courtesy
- Demonstrate a strong sense of responsibility and ownership for their patients
- Perform calmly and efficiently under stressful/emergency situations

References:
1. Schneider and Levinson
2. Chestnut

Evaluation:
1. Daily evaluation

Block Coordinator
Dr. Susan Haley
Reviewed September 2004
Anesthesia for Trauma

**MEDICAL EXPERT:**

1. The resident will demonstrate a solid understanding of the ATLS Trauma Protocol and the role of anesthesia in the assessment and initial stabilization of the trauma patient.
   
   *The resident will be expected to complete ATLS training early in the PGY2 year*

2. The resident will know the assessment and management principles in Acute Trauma for the following problems:
   - Blunt Trauma
   - Penetrating Trauma
   - Airway Trauma/Airway Management
   - Head and Spinal Cord Injury
   - Thoracic Trauma
   - CVS Trauma
   - Abdominal Trauma
   - Major Orthopedic Trauma
   - Hypotension in the trauma patient

3. The resident will demonstrate the ability to develop a detailed perioperative management plan for an acutely traumatized patient in the OR.

4. The resident will be able to coordinate the management of the trauma patient who returns to the OR for repeated surgical procedures.

**COMMUNICATOR:**

1. The resident will be able to effectively communicate with the surgical and critical care teams regarding:
   - The preoperative status of the patient and further investigations/optimization required
   - The extent of the planned procedure and implications on the anesthetic
   - Any problems encountered intraoperatively, either anesthetic or surgical
   - The postoperative care including DVT prophylaxis and the implications of the anesthetic on such care
   - The postoperative pain management planned for the patient

2. The resident will demonstrate compassion and respect when communicating with patients and families.

3. The resident will be able to recognize when further involvement of the family is necessary either for consent purposes or for help in decision-making.
COLLABORATOR:

1. The resident will demonstrate the ability to function efficiently as a member of the hospital’s trauma team. This will involve working with our team members to rapidly assess the patient and form a prioritized treatment plan.

2. The resident will utilize the abilities of other health care team members such as nursing, respiratory therapy, perioperative assistants and surgeons both in the operating room and outside of the OR when necessary.

MANAGER:

1. The resident will demonstrate the ability to function as a member of the daily operating room managing team and make arrangements necessary to expedite the care of the trauma patient.

2. The resident must be able to apply appropriate criteria to triage emergency cases in the setting of multiple trauma patients requiring operative management.

3. The resident must be aware of the interactions of the various OR personnel and resources in a typical day.

4. The resident must be able to coordinate surgeons, anesthesiologists and nurses to run an efficient operating room.

HEALTH ADVOCATE:

The resident will act as the patient’s health advocate in ensuring all guidelines and standards of care are met.

SCHOLAR:

The resident will be able to crucially evaluate the recent literature and alter his/her anesthetic practice accordingly.

PROFESSIONAL:

1. The resident should be able to critically evaluate his/her own practice.

2. The resident should be able to manage anesthetics in a professional manner, including discussing options with patients, families and other consulting services.

3. The resident should be able to work with the surgical services, recognizing differences in personal opinion, methods of practice, and communication styles, all the while maintaining the highest standards of care.

Evaluation:

1. Daily evaluation

References:


Block Coordinator for Trauma Anesthesia
Dr. Michael McMullen
Reviewed January 2008
Anesthesia for Burns and Plastic Surgery

Objectives:

MEDICAL EXPERT:

1. The resident will develop an appropriate management plan for the perioperative care of a patient who has sustained a major thermal injury. This management plan will address the following areas:
   a. Initial Assessment and Cardiovascular Resuscitation
   b. Fluid Management (crystalloid vs. colloid, application of Parkland regimen)
   c. Assessment of Airway Injury and Implications for Management
   d. Detection and Management of Carbon Monoxide Poisoning
   e. Anesthetic Management for Operative Excision and Grafting Procedures with attention to potential for massive transfusion.
   f. Development of a multimodal analgesic regimen for postoperative pain management for the burn patient.

2. The resident will appreciate the alterations in anesthetic management required for a patient with a chronic spinal cord injury (quadriplegia) with a particular focus on the prevention of autonomic hyperreflexia in this patient population.

3. The resident will be familiar with the anesthetic management for major reimplantation surgery and cosmetic surgery.

Evaluation:
1. Daily evaluation
2. Oral exam at the end of the rotation

References:


Block Coordinator – Anesthesia for Trauma and Plastic Surgery
Dr. Michael McMullen
Reviewed January, 2008
KGH/HDH

Chronic Pain Rotation Objectives

The goal of this two-month rotation is to develop an approach to the investigation, management, or referral of patients complaining of chronic non-malignant and cancer pain.

The pain clinic of the Department of Anaesthesiology is “unidisciplinary” in staffing but multidisciplinary in the investigation and treatment of patients. The initial diagnosis or treatment of a pain complaint will be conducted within the Anaesthesiology Chronic Pain Medicine Clinic. However, this clinic exists within the multidisciplinary environment of the Queen’s University Medical Centre ensuring the availability of a wide range of consultations, tests, or treatments. The patient’s local medical facilities and personnel are used whenever possible because of the distances of the referral area.

At the completion of pain medicine rotation, the resident will have acquired the following competencies and will be able to:

**MEDICAL EXPERT/CLINICAL DECISION-MAKER**

**General Requirements**

- Demonstrate diagnostic and therapeutic skills for ethical and effective chronic pain patient care.

- Access and apply relevant information in evaluating and formulating a treatment plan for chronic pain patient.

- Demonstrate effective consultation services with respect to chronic pain patient care.

**Specific Requirements**

- Demonstrate knowledge of anatomy, physiology, pathophysiology and pharmacology of the pain system.

- Demonstrate the role of psychological factors affecting pain perception and disability

- Demonstrate knowledge of age and sex related variables in medicine as they apply to chronic pain patient care.

- Demonstrate knowledge of general principles of evaluation and management of patients with chronic pain: What constitutes an appropriate clinical history and physical examination in patients with persistent pain? Methods of measuring pain in humans.

Demonstrate knowledge of specific diagnostic/treatment modalities (indications, contraindications, complications, technique, and outcome measures):

- Medications: analgesics, anxiolytics, neurolytic, antidepressants, anti-epileptics, sympatholytics, anti-inflammatory, etc.

- Cognitive therapy
- Physical therapy & exercise therapy
- Neuro-augmentive therapy
- Psychological therapy
- Surgical techniques
- Multidisciplinary approach to pain management
- Tests: radiological, electrophysiological, biochemical, etc

- Demonstrate knowledge of basic interventional techniques commonly employed in chronic pain medicine practice, including:
Peripheral nerve blocks
Sympathetic blockades
Trigger points injections
Epidural steroids injections
Blocks for diagnosis and treatment of the facet joint syndrome
Sacroiliac joint injections

- Demonstrate knowledge of basic legal and bioethical issues encountered in chronic pain medicine practice including informed consent.

Subsequent clinical experience investigating and treating patients with specific types of pain complaints will allow the resident to apply these general objectives to specific clinical problems such as:
Complex Regional Pain Syndrome
Neuropathic pain syndromes
Central pain syndrome
Myofascial pain syndromes
Intractable anginal pain
Visceral pain
Pelvic pain
Headaches
Cancer pain
Pain related to peripheral vascular insufficiency
Role of personality disorders
Compensation and disability

COMMUNICATOR

General Requirements
- Establish a professional relationship with patients and families.
- Obtain and collate relevant history from patients, and families.
- Listen effectively.
- Discuss appropriate information with patients and families and other members of the health care team.

Specific Requirements
- Demonstrate consideration and compassion in communicating with patients and families.
- Provide accurate information appropriate to the clinical situation.
- Communicate effectively with medical colleagues, nurses, and paramedical personnel in inpatient, outpatient, and operating room environments.
- Demonstrate appropriate oral and written communication skills.
- Ensure adequate information has been provided to the patient prior to undertaking invasive procedures.

COLLABORATOR

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

**Specific Requirements**
- Demonstrate ability to function in the clinical environment using the full abilities of all team members.

**MANAGER**

**General Requirements**
- Utilize personal resources effectively in order to balance patient care, continuing education, and personal activities.
- Allocate finite health care resources wisely.
- Work effectively and efficiently in a health care organization.
- Utilize information technology to optimize patient care, and life long learning.

**Specific Requirements**
- Demonstrate basic knowledge of the management of pain clinic.
- Demonstrate knowledge of the guidelines concerning controlled medication use as a treatment for cancer and chronic nonmalignant pain in Canada.
- Demonstrate knowledge of the guidelines concerning adequate use of adjuvant medications.
- Demonstrate principles of quality assurance, and adequate follow up for patients with chronic pain.

**HEALTH ADVOCATE**

**General Requirements**
- Identify the important determinants of health affecting chronic pain patients.
- Contribute effectively to improved health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.

**Specific Requirements**
- Provide direction to hospital administrators regarding compliance with national practice guidelines for chronic pain management.
- Recognize the opportunities for anesthesiologists to advocate for resources for chronic pain management.

**SCHOLAR**

**General Requirements**
- Develop, implement, and maintain personal continuing education regarding chronic pain management.
- Critically appraise sources of medical information.

**Specific Requirements**
- Develop criteria for evaluating the pain medicine literature.
- Critically assess the literature using these criteria.
Describe the principles of good research.

Using these principles, judge whether a research project is properly designed.

**PROFESSIONAL**

**General Requirements**

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

**Specific Requirements**

- Include the patient in discussions concerning appropriate diagnostic and management procedures.
- Respect the opinions of fellow consultants and referring physicians in the management of patient problems and be willing to provide means whereby differences of opinion can be discussed and resolved.
- Show recognition of limits of personal skill and knowledge by appropriately consulting other physicians and paramedical personnel when caring for the patient.
- Establish a pattern of continuing development of personal clinical skills and knowledge through medical education.

**References:**


**Clinical assignments**

1. Clinics
   - HDH, Dr Borshch, Tuesday AM – Blocks in OR/PAR
   - HDH, Dr Brown, Wednesday AM – Blocks in OR/PAR
   - HDH, Dr Brown, Wednesday PM – Brock 1 Pain Clinic
   - HDH, Dr Borshch, Thursday AM/PM – Brock 1 Pain Clinic
   - HDH, Dr. D. Bond, Friday AM - Brock 1 Pain Clinic
   - HDH, Dr. D. Bond, Friday PM - Blocks in PAR
   - KGH, Dr. R. Henry, Friday AM/PM - Pelvic Pain Clinic

2. Consults
   - Specifically addressed *pain* consults to Drs. Bond, Borshch, Brown and Henry.

**Evaluation**

The clinical faculty (Drs. Bond, Borshch, Brown and Henry) will perform a daily evaluation of resident knowledge, reasoning, patient assessment, management, and technical skills by direct observation and questioning in the clinical areas, and by chart reviews.

Block Coordinator

**Dr. Yurii Borshch**

Reviewed September 2004
<p>KGH</p><h2>Anesthesia in Remote Locations Objectives</h2><p><strong>MEDICAL EXPERT OBJECTIVES:</strong></p><ol><li>The resident will be familiar with the special considerations created by the location and the expertise of the personnel available when anesthetizing patients in locations outside the OR.</li><li>The resident will be able to:<ul><li>Define the criteria for appropriately selecting patients for anesthesia outside the OR</li><li>Select the necessary monitoring for patients before, during and after the procedure</li><li>Demonstrate the correct monitoring and safety precautions when transporting patients to and from the remote location</li><li>recovery</li></ul></li><li>The resident will be able to list the considerations and techniques for sedation/anesthesia for:<ul><li>radiologic procedures - MRI, CT, Angiography</li><li>cardioversion, ICD placement</li><li>Emergency room procedures</li><li>ECT</li></ul></li></ol><p><strong>MANAGER OBJECTIVES:</strong></p><ul><li>The resident will be able to define how to implement the relevant guidelines for sedation/anesthesia for anesthesia in remote locations in a hospital setting.</li></ul><p><strong>HEALTH ADVOCATE:</strong></p><ul><li>The resident will be familiar with the relevant guidelines for the provision of sedation by Anesthesiologists and non-Anesthesiologists.</li></ul><p><strong>COMMUNICATOR, COLLABORATOR, SCHOLAR AND PROFESSIONAL ROLES:</strong></p><ul><li>As per the generic guidelines</li></ul><p><strong>Evaluation:</strong></p><p>as above</p><p><strong>References:</strong></p><p>Boysen PG. ASA Refresher Course Lectures #154, 1997</p><p>Anesthesiology. 2002;96(4):1004-1017.</p><p>Block Coordinator</p><p>Dr. Ted Ashbury</p><p>reviewed September 2004</p>
General Surgery Objectives

MEDICAL EXPERT

• Residents will be able to perform thorough preoperative evaluations of the patient considering the necessary preparation and premedications for the patient. The patient’s concomitant disease will be taken into consideration.

• The resident will be able to outline the necessary considerations and demonstrate competency in delivering anaesthetics for patients needing:
  - cholecystectomy
  - appendectomy
  - bowel obstruction and perforation
  - bowel resection
  - acute gastrointestinal bleeding
  - splenectomy
  - pancreatic resection
  - hepatic resection
  - portal shunting procedures
  - anorectal surgery

• The resident will be able to provide suitable postoperative management in the recovery room and will provide postoperative analgesia by a number of techniques including IV PCA opioids, continuous thoracic epidural analgesia, and PCEA.

• The resident will be able to discuss the effects of abdominal surgery on pulmonary function postoperatively.

• The resident will be able to describe the following potential complications:
  - Pulmonary Complications
  - Postoperative Intestinal Dysfunction

• The resident will be able to decide which patients are appropriate for consideration of laparoscopic surgical techniques.

• The resident will be cognizant of the relative and absolute contraindications, and the risks/benefits of laparoscopic surgery.

• The resident will be able to describe the physiologic implications of laparoscopic abdominal surgery including the effects of:
  - Positioning
  - C0₂ Pneumoperitoneum

• The resident will describe the indications for conversion to an open procedure.

• The resident will be able to describe the various types of lasers and their uses in surgery.
• The resident will be cognizant of the hazards of laser surgery and will know the appropriate precautions.

• The resident will be able to describe the management of an airway fire.

COMMUNICATOR

• The resident will be able to effectively communicate with the surgical team regarding:
  o The preoperative status of the patient and further investigations/optimization required
  o The extent of the planned procedure and implications on the anesthetic
  o Any problems encountered intraoperatively, either anesthetic or surgical
  o The postoperative care including DVT prophylaxis and the implications of the anesthetic on such care
  o The postoperative pain management planned for the patient
• The resident will be able to
  o Communicate effectively with patients to elicit all necessary information
  o Communicate and empathize with patients in order to relieve their anxiety, answer all questions and agree upon a course of action that is acceptable to all involved
  o Chart appropriately, legibly and clearly
• The resident will demonstrate compassion and respect when communicating with patients and families.
• The resident will be able to recognize when further involvement of the family is necessary either for consent purposes or for help in decision-making.

COLLABORATOR

• The resident will
  o collaborate with other health care disciplines outside the OR when necessary.
  o utilize the abilities of other health care team members such as nursing, respiratory therapy, perioperative assistants and surgeons when in the operating room.
  o Collaborate with other services, particularly ICU and PACU regarding pre and post operative care of patients
  o Review management plans and courses of action with the surgeons at all times
  o Consider advise from allied health professionals
  o Work with the operating room team in a positive manner

MANAGER

• Residents will manage their operating room ie: ensure necessary equipment and medications are available and have their room set up in the fashion so that they will be ready to deal with the unexpected
• Residents will start to become proactive in ensuring appropriate post operative placement for their patients, ie ICU bed, step down bed, etc
• The resident must be aware of the operating room management committee and its role.
• The resident must be able to function as a member of the daily operating room managing team.
• The resident must be aware of the interactions of the various OR personnel in a typical day.
• The resident must be able to coordinate surgeons, anesthesiologists and nurses to run an efficient operating room.

HEALTH ADVOCATE

• Residents will acknowledge the difficulties and decision-making involved in utilization and allocation of finite health care resources
• The resident will act as the patient’s health advocate in ensuring all guidelines and standards of care are met.

**SCHOLAR**

• The resident will be able to critically evaluate the literature and alter his/her anesthetic practice accordingly.
• Residents will be able to effectively self-evaluate in order to practice ongoing self-directed learning.

**PROFESSIONAL**

• The resident should be able to critically evaluate his/her own practice.
• The resident should be able to manage anesthetics in a professional manner, including discussing options with patients, families and other consulting services.
• The resident should be able to work with the surgical services, recognizing differences in person opinion, methods of practice, and communication styles, all the while maintaining the highest standards of care.
• Residents will be punctual, efficient, respectful and professional at all times.

**Evaluation:**
Meeting with coordinator during R4 year to ensure objectives and competencies are being met.

**References:**

Subspecialty Coordinator
**Dr. Dale Engen**
revised November 2007
KGH/HDH:
Urology Block Objectives

MEDICAL EXPERT

Anatomy:
The resident will be able to:
- Describe the innervation of the genitourinary system
- Indicate appropriate levels of neural blockade needed for surgical procedures on each component of
  the genitourinary system
- Define the landmarks for blockade of ilioinguinal and iliohypogastric nerves

Physiology:
The resident will be able to:
- Outline criteria for the diagnosis of:
  - Renal insufficiency
  - Acute renal failure (AFR)
  - Chronic renal failure (CRF)

Pharmacology:
The resident will be able to:
- Discuss the impact of CRF on the pharmacokinetics of drugs used in anesthetic practice
- Indicate which of the drugs used commonly perioperatively depend heavily on renal excretion
- Identify which common anesthetic agents can be used safely in patients who are dialysis-dependent
  and which agents should be avoided.

Clinical Scenarios:
The resident will be able to outline the particular surgical factors that influence anesthetic technique
and management for:
- Circumcision/orchiectomy/orchidopexy
- TUR-P and TUR-BT
- Placement/removal of ureteric stents/calculi
- Percutaneous nephroscopy and nephrolithotripsy
- Laparoscopic procedures
- Extracorporeal shock wave lithotripsy
- Perineal prostatectomy
- Radical retropubic prostatectomy
- Radical cystectomy and ileal conduit
- Radical nephrectomy for tumour
- Donor nephrectomy
- Renal transplantation
- Management of anephric patient for non-urologic surgery

In each case the resident will be able to discuss:
- Pros and cons of alternative anesthetic techniques
- Appropriate monitoring
- Perioperative pain management

The resident will be able to:
- Identify intraoperative complications of increased concern with certain of the above procedures
- Outline procedures for identification and management of such complications
Specific Skills:
- The resident will be able to place a subarachnoid block using either midline or paramedian approach, having selected an appropriate drug dose and analgesic level, and will achieve successful surgical anesthesia 90% of the time.
- The resident will be able to place paravertebral blocks for initial management of post-nephrectomy or retropubic prostatectomy pain.
- The resident will demonstrate the ability to place an epidural catheter preoperatively and use it for preemptive analgesia and combined regional/GA for major urologic procedures.

COMMUNICATOR
The resident will demonstrate:
- the ability to obtain a targeted relevant medical history thoroughly and efficiently.
- sensitivity to and awareness of the concerns of the patient and the family.
- the ability to prepare the patient well for procedures and maintain communication throughout the procedure.
- the ability to discuss risks and benefits of alternative approaches honestly without inducing undue alarm.

COLLABORATOR
The resident will:
- Communicate changes in patient status openly and appropriately to other members of the health care team when needed.
- Ask for help appropriately, recognizing his/her limitations in knowledge and/or skills.

MANAGER
The resident will:
- demonstrate the ability to organize anesthetic tasks efficiently without sacrificing quality.
- work cooperatively as part of a team.
- use resources wisely without sacrificing standards of care.

HEALTH ADVOCATE
The resident will:
- arrange post-hospital follow-up by the family physician of health issues identified perioperatively.
- initiate appropriate education of patients/families re: health related issues.

SCHOLAR
The resident will:
- demonstrate ongoing review of procedures/policies with the goal of detecting areas of potential improvements.
- actively participate in the discussion of problems with other physicians and health care professionals and initiate and/or cooperate in structured investigation in these areas.

PROFESSIONAL
The resident will:
- demonstrate appropriate personal and interpersonal behaviours with patients, families and other health care workers.

Evaluation:
1. Daily evaluation sheets

Recommended Reading:
KGH AP
REGIONAL ANESTHESIA AND ACUTE PAIN MANAGEMENT

MEDICAL EXPERT

Residents are expected to make rounds on the patients on the pain service each day, with the Acute Pain Nurse and Anesthesia Attending during their Acute Pain Block Rotation. Residents will manage acute pain patients after hours when on-call for Anesthesia throughout the duration of their Anesthesia training. They will also be available to the PACU to place peripheral and central neuraxial blocks when required.

1. Understand general principles of local anesthetic pharmacology, including classification of chemical groups.
2. Understand pharmacokinetics and pharmacodynamics of various local anesthetics, including:
   - onset
   - duration
   - biotransformation and excretion
   - motor/sensory differentiation
   - toxicity
3. Understand principles and indications for various local anesthetic adjuvants, including:
   - epinephrine
   - phenylephrine
   - narcotics
   - sodium bicarbonate
   - carbonation
4. Be knowledgeable about maximum recommended doses of local anesthetics, with emphasis on the variations that occur in relations to the site of administration
5. Be familiar with relevant anatomy for regional techniques, including:
   - spinal canal and its contents:
     - variations in vertebral configurations
     - spinal nerves (lateral exit, covering, sensory distribution)
     - epidural, sub-dural, and subarachnoid spaces
     - radiological anatomy of the cervical, thoracic, and lumbar spine
   - neural plexuses of the limbs
     - relationship of nerves, arteries and bones
     - motor innervations of the nerves
   - brachial plexus
     - ulnar nerve
     - radial nerve
     - median nerve
     - musculocutaneous nerve
     - axillary nerve
   - lumbar plexus
     - femoral nerve
     - lateral femoral cutaneous nerve
     - obturator
   - lumbosacral plexus
     - sciatic nerve
       - tibial nerve
       - peroneal nerve
somatic nerves of the trunk
  • iliohypogastric nerve
  • ilioinguinal nerve
  • genitofemoral nerve
  • intercostal nerve
  • paravertebral nerve

6. Understand the principles of sedation for providing regional anesthetic procedures and be able to
describe alternative techniques.

7. Understand indications and contraindications to regional anesthetic techniques, including:
  • central neuraxial blocks
  • peripheral nerve blocks
  • IV regional anesthetic blocks

8. Understand the anatomy, pathophysiology and appropriate management of complications and side
effects of regional anesthetic techniques, including:
  - local anesthetic complications
    CNS toxicity
    cardiac toxicity
    allergy
    preservatives
  - total spinal/epidural anesthesia, sub-dural blocks
  - spinal and epidural hematoma, abscess
  - anterior spinal artery syndrome
  - post-dural puncture headache
  - pneumothorax
  - physiologic side effects
    cardiovascular
    respiratory - phrenic nerve block, intercostal nerve block
  - perioperative nerve injury, including assessment of neurologic deficits

9. Residents will be expected to be able to manage the following technical and knowledge-based skills
pertinent to regional anesthesia:
  1. Neuraxial blocks
    a. Subarachnoid blocks
    b. Epidural blocks
  2. Paravertebral nerve blocks
  3. Peripheral nerve blocks
    • Upper extremity blocks
      a. axillary block
      b. supraclavicular block
      c. infraclavicular block
      d. interscalene block
      e. intravenous regional anesthesia
    • Lower extremity blocks
      a. femoral nerve block
      b. saphenous nerve block
      c. sciatic nerve block
      d. popliteal block
      e. ankle block

**Acute Pain Management:**

1. The resident will be able to describe the anatomy and physiology of pain pathways, the
neuroendocrine response to acute pain and its effects of major organ systems.

2. The resident will have knowledge of the clinical pharmacology of medications used in
treatment of acute pain, including:
   i. Medications: opioids, local anesthetics, NSAIDS, alpha-2 agonists
   ii. Route of administration: oral, SC, IM, IV (including PCA) epidural, intrathecal
iii. Regional anesthesia techniques: neuraxial and peripheral nerve blocks (as outlined in the above objectives)

2. The resident will be able to outline the advantages of one pain relief delivery system over another, and give specific doses, rates and details of these delivery systems.
3. The resident will describe and treat common and life threatening adverse reactions to medications used to treat acute pain.
4. The resident will know the pathophysiology and management of post-spinal headache, including the indications for, and side effects of, an epidural blood patch.
5. The resident will demonstrate knowledge of the policies which must be in place to safely and effectively treat acute pain, monitor its efficacy and promote safety within a multidisciplinary team.

COMMUNICATOR

1. Residents must demonstrate effective communication skills in dealing with patient’s problems.
2. Residents must demonstrate respect and compassion, be able to communicate that the patient’s problems have been understood; and describe options, side effects and complications of therapy in a manner such that the patient can make an informed decision regarding treatment.
3. For the patient’s families, the resident must be able to accurately provide information on each patient’s condition, and the prognosis for the treatment. The resident must demonstrate an ability to make decisions when the family must be relied upon for substitute decision-making when the patient is incapable of deciding for himself or herself.
4. Colleagues – The resident must be able to interact with other physicians caring for the patient in a respectful and professional manner.
5. Health care personnel – The resident must be able to effectively communicate with nursing and other paramedical personnel in a manner that ensures the best possible care for the patient.

COLLABORATOR

1. Residents must demonstrate a professional attitude and competent manner when acting as a consultant as well as be able to consult other disciplines when appropriate. This entails an implicit knowledge of his/her own limitations and those of one’s colleagues.
2. Residents must involve the attending anesthesiologist in the room and the surgeon in all decisions pertaining to a patient’s post operative analgesia management plans.

MANAGER

1. The resident should demonstrate responsibility in providing consultations in a timely manner.
2. The resident should be aware of the cost of various treatment modalities and the necessity of allocating resources appropriately.
3. The resident should be aware of the monitoring requirements of various regional techniques according the CAS guidelines.
4. The resident should be aware of the value of quality assurance, and morbidity & mortality reviews for the Acute Pain Management Service.

HEALTH ADVOCATE

The resident should demonstrate that he/she is knowledgeable of all guidelines concerning the provision of regional anesthesia and in acute pain management to properly ensure the patient’s well-being.

SCHOLAR

Understand and critically evaluate outcome studies related to the influence of regional anesthesia on perioperative outcome. Helpful references include but are not limited to the following:
5. Cousins MJ; Mather LE: Intrathecal and epidural administration of opioids. Anesthesiology 61:276, 1984
8. Liu SS; Carpenter RL; Neal JM: Epidural anesthesia and analgesia: examining their role in post-operative outcome. Anesthesiology 82:1474, 1995

PROFESSIONAL

Residents will be expected to:
1. Be responsible for the Acute Pain Service and manage the patients in a timely and professional manner
2. respond to call from the PACU when they are needed for acute pain issues
3. continue to read around problems and cases to continually improve their knowledge base
4. follow up on patients who experienced complications and/or side effects
5. work with other members of the APMS
6. provide appropriate handover to residents on-call at the end of their day

Textbooks for Reference:

Atlas of Regional Anesthesia.  David Brown
Complications of Regional Anesthesia.  Brendan Finucane
Peripheral Nerve Blocks.  Chelly

Block Coordinator:

Dr. David Goldstein/Dr. Melanie Jaeger
Reviewed and Revised: Feb 2004
By Dr. Melanie Jaeger
KGH/HDH: Gynecology Objectives

This block of clinical material parallels the General Surgery Block objectives very closely.

MEDICAL EXPERT

- Residents will be able to perform thorough preoperative evaluations of the patient considering the necessary preparation and premedications for the patient. The patient’s concomitant disease will be taken into consideration.
- The resident will be able to outline the necessary considerations and demonstrate competency in delivering anaesthetics for patients needing:
  - D&C
  - Hysterectomy
  - Surgery for pelvic malignancy
  - Pelvic exenteration
  - Myomectomy
  - Endometrial ablation
  - Tubal ligation
  - Urinary incontinence surgery
  - Laparoscopic surgery
- The resident will be able to provide suitable postoperative management
- The resident will be cognizant of the relative and absolute contraindications, and the risks/benefits of laparoscopic surgery.
- The resident will be able to describe the physiologic implications of laparoscopic abdominal surgery including the effects of:
  - Positioning
  - CO₂ Pneumoperitoneum
- The resident will describe the indications for conversion to an open procedure.
- The resident should be able to indicate any specific hormonal effects of various gynecologic conditions on the anaesthetic considerations

COMMUNICATOR

- The resident will be able to effectively communicate with the surgical team regarding:
  - The preoperative status of the patient and further investigations/optimization required
  - The extent of the planned procedure and implications on the anesthetic
  - Any problems encountered intraoperatively, either anesthetic or surgical
  - The postoperative care including DVT prophylaxis and the implications of the anesthetic on such care
  - The postoperative pain management planned for the patient
- The resident will be able to:
  - Communicate effectively with patients to elicit all necessary information
  - Communicate and empathize with patients in order to relieve their anxiety, answer all questions and agree upon a course of action that is acceptable to all involved
  - Chart appropriately, legibly and clearly
- The resident will demonstrate compassion and respect when communicating with patients and families.
- The resident will be able to recognize when further involvement of the family is necessary either for consent purposes or for help in decision-making.
COLLABORATOR

- The resident will
  - collaborate with other health care disciplines outside the OR when necessary.
  - utilize the abilities of other health care team members such as nursing, respiratory therapy, perioperative assistants and surgeons when in the operating room.
  - Collaborate with other services, particularly ICU and PACU regarding pre and post operative care of patients
  - Review management plans and courses of action with the surgeons at all times
  - Consider advice from allied health professionals
  - Work with the operating room team in a positive manner

MANAGER

- Residents will manage their operating room ie: ensure necessary equipment and medications are available and have their room set up in the fashion so that they will be ready to deal with the unexpected
- Residents will start to become proactive in ensuring appropriate post operative placement for their patients, ie ICU bed, step down bed, etc
- The resident must be aware of the operating room management committee and its role.
- The resident must be able to function as a member of the daily operating room managing team.
- The resident must be aware of the interactions of the various OR personnel in a typical day.
- The resident must be able to coordinate surgeons, anesthesiologists and nurses to run an efficient operating room.

HEALTH ADVOCATE

- Residents will acknowledge the difficulties and decision-making involved in utilization and allocation of finite health care resources
- The resident will act as the patient’s health advocate in ensuring all guidelines and standards of care are met.

SCHOLAR

- The resident will be able to critically evaluate the literature and alter his/her anesthetic practice accordingly
- Residents will be able to effectively self-evaluate in order to practice ongoing self-directed learning

PROFESSIONAL

- The resident should be able to critically evaluate his/her own practice.
- The resident should be able to manage anesthetics in a professional manner, including discussing options with patients, families and other consulting services.
- The resident should be able to work with the surgical services, recognizing differences in person opinion, methods of practice, and communication styles, all the while maintaining the highest standards of care.
- Residents will be punctual, efficient, respectful and professional at all times

Revised September 2004
Dr. Melanie Jaeger
KGH/HDH
Ambulatory Anesthesia Objectives

**MEDICAL EXPERT**

1. The resident will be familiar with and able to demonstrate the appropriate preoperative assessment, preparation and premedication in an ambulatory setting to include consideration of:
   - NPO status
   - Drugs that reduce the risk of aspiration
   - Postoperative nausea prophylaxis and treatment
   - Anxiolytics, sedatives, and opioids
   - Chronic medications

2. The resident will be able to appropriately select patients suitable for ambulatory anesthesia including the following considerations:
   - Length of surgery
   - Need for transfusion
   - Concomitant disease
   - Extremities of age

3. The resident will be familiar with the salient features of the design and management of a facility catering to efficient ambulatory anesthesia

4. The resident will be able to describe appropriate anesthetic techniques for ambulatory anesthesia including:
   - Appropriate selection of general, regional, sedation, or local anesthesia
   - Intraoperative consideration of potential postoperative problems
   - Postoperative pain management
   - Time in PACU
   - Prophylaxis and treatment of postoperative nausea and vomiting
   - Appropriate selection of muscle relaxants, narcotics, local anesthetics
   - Airway intervention
   - Considerations for regional anesthetic techniques
   - Postoperative arrangements following central neuraxial blocks and plexus blocks
   - Monitored anesthesia care techniques

5. The resident will be able to describe:
   - Discharge criteria and patient instructions
   - Criteria for hospital admission

6. The resident will have a plan for postoperative complications.

**COMMUNICATOR**

- Develop communication skills in ambulatory anesthesia to benefit the patient, the surgeon, and other members of the health care team.
- Demonstrate the ability to discuss the risks and benefits of the various anesthetic techniques relevant to the patient and procedure.
- Obtain the relevant medical history thoroughly and efficiently
COLLABORATOR

- Collaborates with the surgeons and other members of the health care team to ensure optimal patient assessment and preparation
- Asks for help appropriately, recognizing their limitations in knowledge and skills

MANAGER

- Considers health care resources when determining patient’s perioperative management plan
- Demonstrates knowledge of the departmental guidelines for management of patients in the ambulatory setting.

HEALTH ADVOCATE

- Provides appropriate education to ensure patients are well informed and well prepared for their procedure.

SCHOLAR

- Demonstrates ongoing review of procedures / policies with goal of detecting areas of potential improvement
- Critically evaluates the medical literature pertaining to ambulatory anesthesia

PROFESSIONAL

- Demonstrates integrity and honesty when interacting with patients, families, and other health care professionals

Evaluation:
1. Daily evaluation sheets

Recommended Reading:

Block Coordinator – KGH/HDH Block ➔ HDH
Dr. Lindsey Patterson
Reviewed December 2007
KGH/HDH
ENT Anesthesia Objectives

MEDICAL EXPERT:

1. The resident will be able to describe the basic anatomy of the nose, mouth, larynx and neck

2. The resident will understand the hazards, scientific principles, and anesthetic approaches to laser surgery on the larynx.

3. The resident will list the anesthetic problems anticipated in a patient presenting for tracheostomy.

4. The resident will discuss the determinants of pressure in the middle ear and will be able to list the effects of, and contraindications to, the use of $N_2O$.

5. The resident will discuss the physiological effects of chronic upper airway obstruction.

6. The resident will manage patients with a variety of upper airway pathology. This must include knowledge (and practical experience if possible) of the following conditions:
   - congenital anomalies affecting the upper airway (for example, Treacher Collins and Pierre Robin syndrome)
   - epiglottitis
   - croup
   - cancer affecting the upper airway
   - post-tonsillectomy bleeding
   - tonsillar abscess
   - trismus

7. The resident will be able to describe the anesthetic considerations for the following surgery:
   - nasal surgery
   - tonsillectomy/adenoidectomy
   - myringotomy/mastoid and middle ear surgery including cochlea implant
   - laryngoscopy/laryngeal surgery
   - foreign body inhalation
   - bronchoscopy (rigid, flexible, jet ventilation, apnea technique)
   - ENT tumors
   - ENT infections
   - maxillo-facial trauma
   - temperomandibular joint surgery
   - tracheostomy
   - induced hypotension

8. The resident will have a plan for the postoperative pain management for patients having ENT surgery.

COMMUNICATOR

- Develop communication skills with other members of the health care team to benefit the patient
- Demonstrate the ability to discuss the risks and benefits of the various anesthetic techniques relevant to the patient and procedure.
- Learn to communicate with the surgeon to discuss the need for further investigations, postponement of surgery, or special perioperative needs.
COLLABORATOR

- Collaborates with the other members of the health care team to ensure optimal patient assessment and preparation

MANAGER

- Considers health care resources when determining perioperative needs.
- Demonstrates knowledge of the departmental guidelines for management of patients in the perioperative period

HEALTH ADVOCATE

- Provides appropriate education to ensure patients are well informed and well prepared for their procedure.
- Encourages patients to optimize their health status perioperatively

SCHOLAR

- Demonstrates ongoing review of procedures / policies with goal of detecting areas of potential improvement
- Critically evaluates the medical literature pertaining to otolaryngology

PROFESSIONAL

- Demonstrates integrity and honesty when interacting with patients, families, and other health care professionals

Evaluation:
Daily evaluation sheets

Recommended Reading:
1. Ferrari LR, Gotta AW. Anesthesia for Otolaryngeal Surgery. Barash (5th ed) 2006 Chapter 34

Block Coordinator – KGH/HDH Block ➔ HDH
Dr. Lindsey Patterson
Reviewed December 2007
KGH/HDH
Ophthalmology Anesthesia Objectives

MEDICAL EXPERT

1. The resident will be familiar with the preoperative assessment and preparation necessary for these patients. In particular the resident will be familiar with:
   - concomitant diseases
   - considerations re: intraocular pressure
   - effects of ophthalmologic medications
   - effects of anesthetic agents on the eye
   - anticoagulation and eye surgery

2. The resident will develop the communication skills necessary to engage and secure the cooperation of the elderly ambulatory care patient. The resident will correctly identify patients for whom a general anesthetic is necessary.

3. The resident will be familiar with the anatomy, technique of and complications of Retrobulbar and Peribulbar Blocks.

4. The resident will know the implications and cardiovascular management of the oculocardiac reflex.

5. The resident will be able to list the anesthetic considerations in:
   - Open eye injuries
   - Cataract Surgery
   - Retinal Surgery
   - Strabismus Surgery
   - IOP measurements in childhood glaucoma

6. The resident will be able to outline the anesthetic implication of the instillation of SF₆ into the eye.

7. The resident will demonstrate a technique for achieving smooth emergence from GA without bucking and coughing.

8. Post operative ocular complications

COMMUNICATOR

- Develop communication skills with other members of the health care team to benefit the patient
- Demonstrate the ability to discuss the risks and benefits of the various anesthetic techniques relevant to the patient and procedure.
- Learn to communicate with the surgeon to discuss the need for further investigations, postponement of surgery, or special perioperative needs.

COLLABORATOR

- Collaborates with the other members of the health care team to ensure optimal patient assessment and preparation

MANAGER
• Considers health care resources when determining perioperative needs.
• Demonstrates knowledge of the departmental guidelines for management of patients in the perioperative period

HEALTH ADVOCATE

• Provides appropriate education to ensure patients are well informed and well prepared for their procedure.
• Encourages patients to optimize their health status perioperatively

SCHOLAR

• Demonstrates ongoing review of procedures / policies with goal of detecting areas of potential improvement
• Critically evaluates the medical literature pertaining to ophthalmology

PROFESSIONAL

• Demonstrates integrity and honesty when interacting with patients, families, and other health care professionals

Evaluation:
Daily evaluation sheets

Recommended Reading:
McGoldrick KE, Gayer SI. Anesthesia and the Eye. Barash (5th ed) Chapter 33

Block Coordinator – KGH/HDH Block ➔ HDH
Dr. Lindsey Patterson
Reviewed December 2007
KGH/HDH
Dental & Orofacial Anesthesia Objectives

MEDICAL EXPERT
1. The resident will be able to list the anesthetic considerations in:
   • Maxillary / Mandibular surgery
   • Anesthesia in a dental office
   • Dental surgery in an uncooperative patient

COMMUNICATOR
• Develop communication skills with other members of the health care team to benefit the patient
• Demonstrate the ability to discuss the risks and benefits of the various anesthetic techniques relevant to the patient and procedure.
• Learn to communicate with the surgeon to discuss the need for further investigations, postponement of surgery, or special perioperative needs.

COLLABORATOR
• Collaborates with the other members of the health care team to ensure optimal patient assessment and preparation

MANAGER
• Considers health care resources when determining perioperative needs.
• Demonstrates knowledge of the departmental guidelines for management of patients in the perioperative period
• Demonstrates knowledge of CAS guidelines regarding Anesthesia monitoring and environmental safety in remote locations

HEALTH ADVOCATE
• Provides appropriate education to ensure patients are well informed and well prepared for their procedure.
• Encourages patients to optimize their health status perioperatively

SCHOLAR
• Demonstrates ongoing review of procedures / policies with goal of detecting areas of potential improvement
• Critically evaluates the medical literature pertaining to dental anesthesia

PROFESSIONAL
• Demonstrates integrity and honesty when interacting with patients, families, and other health care professionals
Evaluation:
1. Daily evaluation sheets

Recommended Reading:
KGH / HDH: Pre-Assessment Clinic Objectives

Residents will attend pre-assessment clinics for the equivalent of about one month of time over their PGY2-5 years. The following objectives apply to these clinics.

MEDICAL EXPERT:

General Objectives:
The resident will learn to:
1. Reduce perioperative morbidity by screening patient data and initiating further patient encounters / investigations as appropriate.
2. Perform preoperative anesthetic assessments with accurate assessments of the airway and cardiac, respiratory, and neurologic systems.
3. Know the common anesthetic classification systems (e.g. ASA status, NYHA, Mallampati, etc).
4. Address patient inquiries as to pertinent complications and risks of anesthesia.
5. Appreciate the processes involved preoperative evaluation and testing and be able to describe the key factors in the organization of an anesthesia consult clinic.
6. Maintain a professional attitude and behaviour while interacting with patients and other members of the health care team.

Specific Objectives:
The resident will:
1. Become proficient in airway evaluation.
2. Improve skills at directed history and physical examination.
3. Identify patients who require further necessary preoperative preparation, consultation or investigation.
4. Be knowledgeable about the most current guidelines for cardiac evaluation and care before non-cardiac surgery.
5. Understand the basic principles of cardiac investigations, their interpretation, limitations, and their costs / benefits.
6. Learn effective outpatient preparation strategies for surgical patients presenting with common medical problems such as asthma, diabetes mellitus, ischemic heart disease, and sleep apnea.
7. Recognize the difficulties and limitations of preoperative evaluation with short time intervals before anticipated surgery.
8. Develop anesthetic management plans with the consultant anesthesiologist.
9. Be able to present the various anesthetic techniques available for the surgical procedure and inform the patient about the specific risks and benefits of each technique.
10. Be able to discuss the strategies for blood conservation techniques and the potential risks of blood transfusion.
11. Inform patients which pain management services may be offered to them and the potential advantages and disadvantages of each.
12. Be able to prepare and educate the patient regarding the need for specialized postoperative care (e.g. monitoring, ICU admission, potential for postoperative ventilation).
13. Address the role and indications for common preoperative therapies (anxiolytics, bronchodilators, antisialagogues, steroids, perioperative β-blockers, antacids etc).
14. Learn to communicate with the referring physician and operating room staff to ensure all necessary equipment, precautions, preparations are complete by the time of surgery. (eg. difficult airway equipment, latex allergy precautions, need for postoperative monitoring.)
COMMUNICATOR:

- Develop communication skills in preoperative consultation to benefit the patient, the referring physician, and the consultant.
- Demonstrate the ability to discuss the risks and benefits of the various anesthetic techniques relevant to the patient and procedure.
- Be able to dictate a clear, concise anesthetic consultation letter including the anesthetic considerations and a clear plan for the perioperative management.
- Know the appropriate organization, content, format and length of consultation notes.
- Learn to communicate with the referring physician directly to discuss the need for further investigations, postponement of surgery, or special perioperative needs.

COLLABORATOR:

- Collaborates with the family physician and/or the referring physician to ensure optimal patient assessment and preparation (e.g., baseline test results, blood pressure management)

MANAGER:

- Considers health care resources when determining preoperative testing needs.
- Demonstrates knowledge of the departmental guidelines for management of patients in the perioperative period (e.g., sleep apnea, sickle cell anemia, malignant hyperthermia, implantable cardioverter-defibrillator, ambulatory surgery, monamine oxidase inhibitors).

HEALTH ADVOCATE:

- Provides appropriate education to ensure patients are well informed and well prepared for their procedure.
- Encourages patients to optimize their health status preoperatively (e.g., smoking cessation, blood pressure control, use of nCPAP etc)

SCHOLAR:

- Demonstrates ongoing review of procedures/policies with goal of detecting areas of potential improvement
- Critically evaluates the medical literature pertaining to preoperative evaluation

PROFESSIONAL

- Demonstrates integrity and honesty when interacting with patients, families, and other health care professionals

Evaluation:
1. Daily Evaluation

References:
Pediatric Anesthesia Block Objectives

CHEO

Subspecialty Objectives for Pediatric Anesthesia Training

The pediatric anesthesia training in Kingston consists of 12 week's clinical pediatric exposure at CHEO in Ottawa and ongoing exposure to pediatric cases in Kingston. The Goals and Objectives for pediatric anesthesia training have been divided up into an introductory rotation (PGY 2 & 3 residents), and a senior rotation (PGY4 & 5 residents). The goals and objectives list the minimum of what is expected of a resident in terms of their knowledge base (including clinical case management), procedural skills, and attitude and communication skills. The minimal expected basic and clinical science pediatric core knowledge content areas are identified in section III and IV of this manual. The acquisition of this knowledge base will occur over the PGY2-5 years at various stages and rates with specific areas of knowledge being acquired with the corresponding Pediatric Core program lectures and the clinical rotation in pediatric anesthesia. The depth of comprehension of a resident’s knowledge base and their technical skills is expected to increase, as residents become more senior.

Pediatric Anesthesia

Goals:
Given a pediatric patient presenting for any type of surgery, the resident will outline a plan of management and institute a safe anesthetic for that patient who will encompass an awareness of the psychological impact of the experience for the child and its family.

MEDICAL EXPERT OBJECTIVES:

1. The resident will outline the important differences between adult, pediatric, neonatal, and ex-premature patients’ anatomy and physiology in relationship to anesthesia.

2. The resident will understand the altered pharmacodynamics in the newborn infant.

3. The resident will be able to describe, in particular, the differences in the adult and pediatric airway and be proficient in the assessment of the pediatric airway, and the management of the difficult airway.

4. The resident will be able to perform an appropriate preoperative evaluation of a pediatric patient using relevant historical, physical, and laboratory information.

5. The resident will know the currently acceptable criteria for accepting children for anesthesia and the guidelines pertaining to outpatient anesthesia and preoperative fasting.

6. Residents will be able to institute the appropriate perioperative fluid and electrolyte, and temperature management in the perioperative period for surgical paediatric patients.

7. The resident will demonstrate an appropriate approach to, and management of, common postoperative issues including postoperative pain, agitation, nausea and vomiting, PACU discharge criteria, and criteria for unplanned admission.

8. The resident will learn the principles of using pediatric anesthesia circuits and equipment and will be able to choose the appropriate equipment for any case.

9. The resident will describe the anesthetic implications of the following disorders:
   - haematologic disorders including anemia, sickle cell states, thalassemia, ITP, hemophilia
• atypical plasma cholinesterases
• diabetes mellitus
• malignant diseases
• non-cardiac surgery in children with congenital heart diseases
• Down's Syndrome
• malignant hyperpyrexa
• cystic fibrosis
• renal insufficiency or failure

10. The resident will understand the anesthetic implications of pediatric syndromes and unusual disorders to the depth described in Stewart's Manual of Pediatric Anesthesia.

11. The resident will describe the special considerations of the premature infant coming for surgery and also will understand the longer term problems of providing anesthetic care to patients who were born prematurely but present for surgery at a later date.

12. The resident will describe the anesthetic management of patients presenting for common neurosurgical procedures. These will include:
• patients with hydrocephalus
• increased intracranial pressure
• intracranial hematoma
• craniosynostosis
• myelomeningocele
• encephalocele
• spinal cord tumors
• intracranial tumors.
• common neuroradiologic techniques.

10. The resident will describe the anesthetic management and potential complications of patients presenting for common procedures in the following areas:
• ophthalmology
• dental surgery
• elective ENT procedures
• kyphoscoliosis

11. The resident will discuss, diagnose and treat the more common forms of pediatric lung disease. In the newborn, the resident will discuss the importance of pulmonary surfactant; respiratory distress syndrome of the newborn; and abnormal breathing patterns. In the older child the resident will diagnose and treat croup, bronchiolitis, cystic fibrosis and epiglottitis. The resident will describe in detail the anesthetic management of upper airway obstruction in a child.

12. The resident will describe the anesthetic management of common congenital defects that may require surgery during the neonatal period. As a minimum the resident will describe the management of:
• congenital lobar emphysema
• congenital diaphragmatic hernia
• tracheoesophageal fistula and esophageal atresia
• congenital hypertrophic pyloric stenosis
• omphalocele and gastroschisis
• biliary atresia.

15. The resident will describe the anesthetic technique used in management of common closed heart operations including patent ductus arteriosus, aortic coarctation, palliative surgery to increase pulmonary blood flow, palliative surgery to increase intra-atrial mixing, and palliative surgery to decrease pulmonary blood flow. The resident will describe an acceptable technique of preoperative
assessment of patients with congenital heart disease. The resident will describe a plan of management for patient presenting for non-cardiac surgery who has congenital heart disease.

16. The resident will be familiar with the perioperative management of children with common paediatric cardiovascular anomalies including: Tetralogy of Fallot, patent ductus arteriosus, aortic coarctation, atrial septal defects and ventricular septal defects.

17. The resident will utilize the appropriate regional anesthetic techniques in pediatric anesthesia and pediatric analgesia.

18. The resident will be familiar with the practical aspects of providing anesthesia for children outside of the OR including anesthesia for MRI, CT scan, other investigative procedures.

19. During anesthesia rotations at CHEO and during the residency in Kingston, the resident will be expected to provide anesthesia in as many of the following cases as possible, and be able to completely describe the approach to anesthesia management in all:
   - circumcision
   - common hernia repair
   - pyloric stenosis
   - neonatal surgery (including TE fistula)
   - reimplantation of ureters
   - ex-premature child
   - cystoscopy
   - orchidopexy
   - cranioplasty
   - posterior fossa surgery
   - cleft lip and palate repair
   - burns
   - foreign body in the airway
   - patent ductus arteriosus
   - non-open heart cyanotic congenital heart disease
   - bronchoscopy
   - tonsillectomy
   - myringotomy and tubes
   - Harrington rod insertion

20. The resident will be expected to know how to manage the following situations in paediatric anesthesia:
   - rapid sequence of induction
   - child with a recent URTI
   - malignant hyperpyrexia muscle biopsy controlled hypotension

COMMUNICATOR:

1. The resident will be able to use a variety of approaches in dealing with children of all ages in their preparation for anesthesia and surgery.

2. The resident will recognize the psychological impact of hospitalization, anesthesia, and surgery on both the patients and their families.

3. The resident will provide accurate, appropriate information in a timely fashion to the family.

4. The resident will ensure that informed consent is obtained prior to undertaking invasive procedures.
5. The resident will effectively communicate with all members of the treatment team using effective verbal communication skills.

6. The resident’s written communication, including charting of the perioperative events, will consist of concise and clear documentation.

**COLLABORATOR:**

1. The resident will demonstrate the capacity to consult effectively with the neo and perinatologist, the pediatricians and the surgeons to assure optimal management of patients.

2. The resident will work effectively as an integral member of the perioperative team. This will include the ability to resolve conflicts, provide feedback and assume a leadership role where appropriate.

**MANAGER:**

1. The resident will utilize resources effectively to provide anesthesia services to the pediatric patient.

2. The resident will practice according to national standards and provincial guidelines for the management of pediatric patients.

**HEALTH ADVOCATE:**

1. The resident will demonstrate increasing expertise and leadership in maintaining and improving the standards of pediatric anesthesia practice and patient care.

**SCHOLAR:**

1. The resident should have the ability to critically review the literature and understand and evaluate new information and research.

2. The resident should contribute to the learning of others.

3. The resident should contribute to the development of new knowledge when possible.

**PROFESSIONAL:**

1. The resident should demonstrate an increasing sense of responsibility and “case ownership”.

2. The resident should deliver the highest quality of care with integrity, honesty and compassion.

3. The resident should demonstrate appropriate respect for the opinion of patients and team members in the provision of quality pediatric care.

**Introductory (PGY2 and PGY3) Pediatric Anesthesia Objectives**

**PGY2 & PGY3 Knowledge:**

To gain an appreciation of:

1. The psychological impact of hospitalization, anesthesia, and surgery on both the patient and their family.

2. The anatomical, pharmacological, and physiological differences between the neonate, infant, child and adult.
3. The various approaches in providing perioperative anesthetic care for children of all ages, including the fasting guidelines as applied to pediatric patients.
4. The differences in the adult and pediatric airway and the assessment of the pediatric airway.
5. Pediatric anesthesia equipment, circuits, and monitors.
6. The approach to, and management of common postoperative issues including postoperative pain, agitation, nausea and vomiting, PACU discharge criteria, and criteria for unplanned admission.
7. An appropriate preoperative evaluation of a pediatric patient using relevant historical, physical, and laboratory information.
8. The skills to participate in and/or present M&M rounds, clinical pediatric research projects and department rounds.
9. The process of critically searching, evaluating and applying the pediatric anesthesia literature knowledge base available from computers, textbooks and journals.

**PGY2 & PGY3 Case Management expectations:**
1. Manage ASA class 1 and 2 patients greater than 2 years of age with limited assistance for uncomplicated surgery including induction, maintenance, emergence, charting and transportation to the PACU.
2. Accurately estimate fluid requirements, and replace (crystalloid, colloid, and blood) for routine cases.
3. To be able to identify and formulate a differential diagnosis and treatment plan for basic intraoperative problems including laryngospasm, hypertension, hypotension, bradycardia, tachycardia, desaturation, low urine output, and high airway pressure.
4. Identify anatomical landmarks, and list the complications and contraindications to regional and local blocks (caudal, epidural, iliohypogastric, ilioinguinal nerve block, and local infiltration). Prescribe appropriate doses of local anesthetic for a pediatric patient.
5. Assess, and manage acute postoperative pain for uncomplicated pediatric surgical procedures.

**PGY2 & PGY3 Technical Skills:**
*The resident will be expected to acquire confidence and ability to adeptly.*
1. Secure intravenous access in the pediatric patient.
2. Prepare and check anesthetic equipment (including invasive monitors and fluid warmers) and prepare both routine and resuscitative anesthetic medications.
3. Perform both an inhalational induction as well as intravenous induction (including RSI with CP) in the pediatric patient.
4. Select an appropriate sized LMA and perform LMA placement.
5. Select an appropriate sized ETT and perform both oral and nasal intubation in the elective normal pediatric patient with minimal assistance.
6. Assess the patient for appropriate timing of extubation.
7. Prescribe appropriate doses (LA, opioid) and perform caudal anesthesia.
8. Utilize appropriate monitors for transportation of the pediatric patient.
9. Prescribe appropriate postoperative oxygen, analgesics and anti-emetic therapy.

**PGY2 & PGY3 Attitude and Communication Skills:**
1. Reassure and comfort the pediatric patient and the patient’s parents.
2. Work and communicate effectively with the anesthesia faculty and nursing staff.
3. Demonstrate an awareness of one's own limitations and seek assistance when appropriate.
4. Demonstrate an enthusiasm to acquire new knowledge and clinical skills.

**Senior (PGY4 and PGY5) Pediatric Anesthesia Objectives**

**PGY4 & PGY5 Knowledge Objectives:**
1. To build on the introductory knowledge objectives identified above.
2. To critically appraise and incorporate new information from the medical literature.
3. To master the basic and clinical science core knowledge content objectives as applied to pediatrics identified in Section VI.

4. To be able to discuss and describe a comprehensive anesthetic management plan for pediatric patients for:
   - aortic coarctation repair
   - burns
   - congenital diaphragmatic hernia
   - craniosynostosis
   - croup and epiglottitis
   - encephalocele
   - increased intracranial pressure
   - necrotizing enterocolitis
   - non-cardiac surgery in patients with congenital heart disease
   - omphalocele and gastrochisis
   - palliative cardiac surgery to increase intra-atrial mixing
   - palliative cardiac surgery to increase or decrease pulmonary blood flow
   - spinal cord tumors
   - tracheo-esophageal fistula and esophageal atresia

**PGY4 & PGY5 Case Management Expectations:**

1. To build on, and successfully complete the PGY2 and PGY3 case management expectations listed above.

2. Manage ASA class 1 and 2 patients greater than 1 month of age with limited assistance for uncomplicated surgery including induction, maintenance, emergence, charting and transportation to the PACU.

3. To be able to both describe a comprehensive anesthetic management plan and provide anesthesia for the following procedures:
   - appendectomy
   - bowel resection
   - bronchoscopy and esophagoscopy
   - circumcision
   - cleft lip and palate surgery
   - compound and closed extremity fractures
   - cystoscopy
   - dental surgery
   - foreign body in the airway
   - Harrington rod instrumentation and other scoliosis surgery
   - hydrocephalus
   - hernia repair
   - myringotomy and tubes
   - intracranial tumors
   - laser surgery of the airway
   - neonatal surgery
   - nephrectomy
   - orchidopexy
   - PDA ligation
   - Pectus excavatum repair
   - Post tonsillectomy bleed
   - posterior fossa surgery
   - pyloric stenosis
   - re-implantation of ureters
   - sedation for satellite anesthesia (MRI, CT, LP for BM etc)
   - strabismus surgery
   - surgery for infants < 60 post conceptual age
   - surgery in a child with recent URI
   - surgery in the patient with a difficult airway
   - surgery for an uncooperative patient
   - tonsillectomy
**PGY4 & PGY5 Technical Skills:**

*Building on the PGY2 & PGY3 skills, the resident will be expected to acquire confidence and ability to adeptly:*

1. Secure intravenous access in the premature and newborn infant.
2. Secure 'large' bore intravenous access in the pediatric patient undergoing a major surgical procedure or requiring resuscitation.
3. Select an appropriate ETT size and perform intubation in the premature and newborn infant.
4. Perform aseptic arterial and central line insertion in the pediatric patient.
5. Prescribe appropriate doses and demonstrate the technical ability to perform spinal anesthesia in the infant as well as epidural anesthesia in the pediatric patient.
6. Demonstrate an increasing confidence in performing local and regional anesthesia techniques as applied to pediatric patients.

**PGY4 & PGY5 Attitude and Communication Skills:**

1. To demonstrate an increasing sense of responsibility and 'case ownership', as well as demonstrate adequate preparation in reading for assigned clinical cases.
2. To demonstrate a willingness and an ability to impart acquired knowledge to more junior residents, medical students and other health care professionals.
3. To demonstrate a willingness and an ability to act as a supervisor and instructor to more junior residents, medical students and other health care professionals.

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Block Coordinators:

Kingston: **Dr. Ted Ashbury**

CHEO: **Dr. Jarmila Kim**

reviewed September 2004
KGH
Airway Objectives

Overall Educational Objectives As Key Competencies

<table>
<thead>
<tr>
<th>CANMeds Role</th>
<th>KEY COMPETENCIES FOR AIRWAY MODULE AND ROTATION</th>
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<tbody>
<tr>
<td>MEDICAL EXPERT</td>
<td>Demonstrate proficiency in the following required competencies:</td>
</tr>
</tbody>
</table>

- Airway assessment
- Airway anatomy
- Application of the American Society of Anesthesiologists and Canadian Airway Focus Group difficult airway algorithms
- Optimization of mask ventilation and direct laryngoscopy
- The laryngeal mask airway (LMA) and insertion techniques
- The combitube and insertion techniques (mannequin)
- Trans-tracheal jet ventilation theory and technique (mannequin)
- Cricothyroidotomy theory and techniques (anatomy labs)
- Retrograde intubation theory and techniques (anatomy labs)
- Flexible fiberoptic bronchoscope (FOB) facilitated intubation
- Nasal intubation (with and without adjuncts)
- Awake intubation
  - Preoperative preparation, sedation, and monitoring
  - Topicalization technique
  - Superior laryngeal nerve block
  - Cricothyroid puncture for topicalization
  - Acceptable dose of local anesthetic
- Knowledge of indications, contraindications, complications, assembly (where applicable), use, and care of airway adjuncts listed below
  - Gum elastic bougie-
  - Lighted stylet
  - Rigid indirect fiberoptic laryngoscope (eg. Bullard)
  - Intubating laryngeal mask
  - Straight blades
  - Articulating blade (eg. McCoy)
- Intubation of patients with normal and simulated difficult airways using at least two of the following techniques
  - Gum elastic bougie
  - Lighted stylet
  - Rigid indirect fiberoptic laryngoscope (eg. Bullard)
  - LMA-facilitated FOB examination
  - Fastrach insertion and intubation
  - Straight blade laryngoscopy
  - Articulating blade (eg. McCoy)
- Optional competencies:
  - Inhalation induction and LMA insertion
  - Inhalation induction and endotracheal intubation
  - Assistance with tracheostomy under local anesthesia
COMMUNICATOR
- Demonstrate effective communication with patient (description of procedures, informed consent)
- Effectively communicate with OR team regarding equipment and assistance required
- Provide thorough documentation on anesthetic record of perioperative events specifically related to airway management

COLLABORATOR
- Collaborate with OR team members to ensure optimal management of patients (i.e. ENT surgeon when required)

MANAGER
- Demonstrate proper care and maintenance of airway equipment

HEALTH ADVOCATE
- Appropriately inform patients with difficult airways (post-op visit, formal letter)

SCHOLAR
- Use all learning aids available (textbooks, web-based resources, mannequins, simulator, anatomy lab)

PROFESSIONAL
- Demonstrate a sense of responsibility, integrity, honesty and compassion when caring for patients
- Demonstrate respect for patients and colleagues

REFERENCES:

Block Coordinator
Dr. Rick Zamora
reviewed September 2004
Community Anesthesia

The objectives for this rotation will fall under the appropriate subspecialty objectives for the list that is assigned. In addition to those objectives, the following are specific for the practice of anesthesia in a community setting

MEDICAL EXPERT

- Residents will be able to perform thorough preoperative evaluations of the patient, and be able to make decisions in the absence of tertiary technological resources in some cases.
- The resident will be able to outline the necessary considerations and demonstrate competency in delivering anesthetics for various anesthetic subspecialties as practiced at that site.
- The resident will be able to provide suitable postoperative management in the recovery room and will provide postoperative analgesia within the confines of the policies and procedures in place at that site.
- The resident will practice autonomy with independent decision making in the absence of other medical specialty resource personnel.

COMMUNICATOR

- The resident will be able to effectively communicate with the surgical team regarding:
  - The preoperative status of the patient and further investigations/optimization required
  - The extent of the planned procedure and implications on the anesthetic
  - Any problems encountered intraoperatively, either anesthetic or surgical
  - The postoperative care including DVT prophylaxis and the implications of the anesthetic on such care
  - The postoperative pain management planned for the patient
- The resident will be able to:
  - Communicate effectively with patients to elicit all necessary information
  - Communicate and empathize with patients in order to relieve their anxiety, answer all questions and agree upon a course of action that is acceptable to all involved
  - Chart appropriately, legibly and clearly
- The resident will demonstrate compassion and respect when communicating with patients and families.
- The resident will be able to recognize when further involvement of the family is necessary either for consent purposes or for help in decision-making.

COLLABORATOR

- The resident will:
  - Collaborate with other health care disciplines outside the OR when necessary.
  - Utilize the abilities of other health care team members such as nursing, respiratory therapy, perioperative assistants and surgeons when in the operating room.
  - Collaborate with other services, particularly ICU and PACU regarding pre and post operative care of patients
  - Review management plans and courses of action with the surgeons at all times
  - Consider advice from allied health professionals
  - Work with the operating room team in a positive manner.
MANAGER

- Residents will manage their operating room ie: ensure necessary equipment and medications are available and have their room set up in the fashion so that they will be ready to deal with the unexpected
- The resident must be aware of how the operating rooms are managed in that hospital
- The resident must be aware of the interactions of the various OR personnel in a typical day.
- The resident must be able to coordinate surgeons, anesthesiologists and nurses to run an efficient operating room
- The resident will experience different departmental procedures, practices and policies

HEALTH ADVOCATE

- Residents will acknowledge the difficulties and decision-making involved in utilization and allocation of finite health care resources
- The resident will act as the patient’s health advocate in ensuring all guidelines and standards of care are met.

SCHOLAR

- The resident will be able to critically evaluate the literature and alter his/her anesthetic practice accordingly
- Residents will be able to effectively self-evaluate in order to practice ongoing self-directed learning

PROFESSIONAL

- The resident should be able to critically evaluate his/her own practice.
- The resident should be able to manage anesthetics in a professional manner, including discussing options with patients, families and other consulting services.
- The resident should be able to work with the surgical services, recognizing differences in person opinion, methods of practice, and communication styles, all the while maintaining the highest standards of care.
- Residents will be punctual, efficient, respectful and professional at all times

Evaluation:
1 Daily Evaluation

Block Coordinator
Dr. Melanie Jaeger/Dr. Bob Heid
revised July 2005
Section VI:
Objectives for Critical Care and Medicine Rotations
of the Postgraduate Program in Anesthesiology

The RCPS requires Anesthesiology residents to have 6 months of Intensive Care/Critical Care (ICU) exposure during the PGY2 to PGY5 years of training. At Queen’s University, these 6 months have been assigned as follows:

- **PGY2**: 1 month Neonatal ICU
- **PGY3**: 2 months Adult ICU
- **PGY4**: 2 months Adult ICU
- **PGY5**: 1 month Adult ICU as a “fellow”

The requirement for 6 months of Internal Medicine has been met through a variety of options. Generally, in this program, it is recommended that the resident do the following rotations in the PGY3 and PGY4 years:
- Cardiology: 2 months
- Respirology: 2 months
- Options: 2 months

The Options can include:
- Transfusion Medicine: 1 month
- Nephrology: 1 – 2 month(s)
- General Internal Med.: 1 – 2 month(s)
- Other (with program director approval)

### A. Intensive Care Unit

**Coordinators:** Dr. Susan Moffatt and Dr. John Drover

The resident will rotate through the ICU three times during the Anesthesiology program for a total of 4 months of adult ICU training during their residency, as well as an additional month in the Cardiovascular Intensive Care Unit (CVRI). In the PGY 2 or 3 year there is a 2 month rotation, in the PGY 4 year there is a one month rotation in ICU and one month in CVRI, while in the PGY5 year the senior resident will spend the final month in the ICU. During each of these rotations the resident will be expected to accept progressively more responsibility for patient care culminating in the final rotation where the resident will function as a “fellow” working in a resource and consultative role for the other residents.

The Pediatric ICU is currently (2004) physically in the same area as the Adult ICU. Residents may not be responsible for the care of these patients but should avail themselves of the opportunity to follow the progress of the Pediatric patients who are admitted to the unit.

**Goal:**
Given a patient who requires admission to an ICU, the resident will perform an appropriate history and physical examination, enact a plan of investigation, and start appropriate treatment. The resident will assess the need for invasive monitoring and institute appropriate monitoring.

**Objectives:**

### Medical Expert

1. **Cardiovascular**
   - The resident will provide the differential diagnosis of chest pain, will be able to distinguish the etiology of chest pain using laboratory and clinical means, will be able to outline a therapeutic treatment for acute myocardial infarction and myocardial ischemia.
   - The resident will discuss the current theories of pathogenesis of ischemic heart disease. The resident will diagnose and manage the various complications of acute myocardial infarction.
   - The resident will diagnose and outline treatment for all cardiac arrhythmias.
The resident will outline the pathogenesis of hypertensive crisis and its current treatment and complications. The resident will discuss the various pathogenic mechanisms of shock. The resident will outline current treatments for these various types of shock.

2. **Pulmonary**
   - The resident will outline the causes of respiratory failure in the critically ill patient. The resident will also outline current therapeutic techniques for respiratory support.
   - The resident will describe the functional and physiologic basis of mechanical supportive ventilation. The resident will understand high frequency positive pressure ventilation.
   - The resident will be familiar with the basic principles of chest x-ray interpretation.
   - The resident will understand the diagnosis and treatment of airway emergencies in children.
   - The resident will recognize the causes, pathogenesis and treatment of pulmonary edema.
   - The resident will discuss the pathogenesis, diagnosis and treatment of acute pulmonary infections.
   - The resident will discuss the current therapy of asthma.
   - The resident will discuss the pathogenesis of adult respiratory distress syndrome. The resident will discuss the current management of adult respiratory distress syndrome.

3. **Renal fluids and electrolytes**
   - The resident will discuss the causes of acute renal failure and be able to outline a plan of management for patients with this condition.
   - The resident will adjust drug dosages for patients in renal failure.
   - The resident will outline the pathogenesis, diagnosis and treatment of all common electrolyte disturbances in pediatric and adult patients.
   - The resident will discuss the pathogenesis, diagnosis and treatment of all common acid base disorders.

4. **Neurology**
   - The resident will discuss the causes of acute changes in level of consciousness. The resident will outline a diagnostic and therapeutic approach to patients with altered states of consciousness.
   - The resident will outline a plan of management for patients with CNS trauma.

5. **Trauma**
   - The resident will outline a plan of management for the patient who has multisystem organ injuries.
   - The resident will assess and manage patients with the following forms of trauma:
     - abdominal trauma
     - chest trauma - lungs and bony structure
     - chest trauma - heart and great vessels
     - orthopedic trauma
     - genitourinary trauma
     - upper airway trauma
     - the burned patient

6. **The resident will be capable of discussing/managing the following:**
   - Pain and Sedation in the ICU
   - Respiratory Failure, Methods of Mechanical Ventilation, Modes of weaning
   - nutritional support of the critically ill
   - host defense mechanisms in the critically ill patient
   - Transport of critically ill patients
   - Declaration of brain death

7. **Specific Syndromes**
   The resident will describe the clinical features, discuss the pathophysiology, and be able to manage the following:
   - acute gastrointestinal hemorrhage
   - other hemorrhage and/or hemostatic failure
   - intestinal ischemia
   - fulminant hepatic failure
   - acute poisoning/intoxication
• Shock
• Sepsis/septicemia
• MODS/SIRS
• Coma, Status Epilepticus
• Burn patients
• disorders of body temperature

8. The resident will outline the indications, complications and inadequacies of the following forms of monitoring:
   • electrocardiographic
   • arterial blood pressure
   • CVP and Swan-Ganz catheter
   • end-tidal CO₂
   • arterial blood gases
   • electroencephalogram diagnosis of brain death

9. The resident will have a wide knowledge of the drugs used to treat the critically ill. The resident will describe the pharmacology of commonly used drugs in the following categories:
   • anti-arrhythmics
   • beta blockers
   • bronchodilators
   • diuretics
   • vasodilators
   • vasopressors
   • steroids
   • drugs used to relieve myocardial ischemia
   • drugs used to decrease stomach acidity

Communicator

The resident will:
   • effectively communicate with all members of the ICU team (nurses, residents, attending staff) about patient issues
   • be able to communicate with patients, their family and admitting service about daily patient progress
   • keep clear, concise, legible documentation of daily patient progress in the patients’ hospital chart
   • be expected to participate in end-of-life discussions with ICU team and family members

Collaborator

The resident will:
   • enlist the help and advice of consultants when indicated
   • work with members of the ICU team to provide optimal patient care (nurses, physicians, dieticians, physiotherapists, pharmacologists, …)

Manager

Residents should be able to:
   • efficiently manage the daily care of several patients
   • appropriately prioritize tasks as well as triage patients
   • effectively and safely supervise junior residents both for daily patient management as well as during technical procedures
   • be aware of the organization and delivery of Critical Care Services including the design and staffing of an ICU

Health Advocate

Residents should be expected to:
• Demonstrate attention to patient safety
• always honor patient confidentiality
• obtain consent when required
• act as a patient advocate in all circumstances
• be able to allocate health care resources appropriately

Scholar
Residents will be expected to:
• Demonstrate on going self-directed learning
• Actively participate in rounds
• Teach junior residents and medical students
• Demonstrate evidence based practice
• Demonstrate commitment to ongoing personal education

Professional
Residents must display compassion, empathy, caring, honesty and ethical behavior at all times

B. Neonatal Intensive Care Unit

The resident will spend one month in the NICU, usually at the end of the PGY2 year. This month of NICU training is considered to part of the six months of ICU training required by the RCPS.

The neonatal intensive care unit rotation is intended to allow residents to function effectively as members of the neonatal team, to feel comfortable in the recognition and management of neonatal problems, to become competent in the performance of procedures and to become able to communicate fully with families. Responsibility is gradually increased as appropriate to the resident's capability and seniority.

ROLES

Medical Expert/Clinical Decision Maker
- Be able to describe the normal physiologic changes which occur at birth
- Recognize the limited thermoregulatory mechanisms in the neonate and list the adverse effects of hypothermia in this age group
- Be able to elicit a concise and relevant history, appropriate to the infant's clinical condition/problem(s), and identify the prenatal and intrauterine conditions which put the neonate at risk
- This should include areas unique to the neonate such as such as social, environmental and antenatal history.
- Describe and provide the usual delivery room care of the healthy newborn as well as assign and indicate the importance of the APGAR score
- Be aware of and practice the principles of resuscitation of the newborn
- This should include being able to describe the equipment (sizes) and drugs (doses) necessary for resuscitation of the newborn as well as being able to perform technical skills of oro- and naso-tracheal intubation and venous cannulation
- Outline the currently recommended management for meconium aspiration
- Provide a differential diagnosis for neonatal distress
- Discuss and list a differential diagnosis and management plan for neonatal cardiorespiratory depression
- Be able to outline the ventilation techniques for the newborn
- Perform a physical examination that is relevant, appropriate and sufficiently elaborate to the infant's condition.
- Specific aspects include gestational age, assessment, measurements, blood pressure determination, fundoscopic examination and assessment of congenital anomalies.

- Select relevant medical investigations that are relevant to the infant’s condition, and understand the limited availability of certain investigations outside the tertiary care centre.

- Specific investigations would include understanding the different normal values for neonates, and interpretation of the neonatal chest and abdominal x-ray.

- While collecting data for history, examination and investigation, be able to formulate a problem list and management plan for the newborn infant. This includes the following neonatal conditions, as outlined below:

  1. Airway obstruction in the newborn
  2. Respiratory distress syndromes
  3. Meconium aspiration
  4. Persistent fetal circulation
  5. Pneumothorax
  6. Diaphragmatic hernia
  7. Tracheo-esophageal fistula
  8. Congenital heart disease
  9. Hypovolemia
  10. Hypothermia
  11. Hypoglycemia
  12. Periventricular hemorrhage
  13. Bronchopulmonary dysplasia
  14. Retinopathy of prematurity
  15. Necrotizing enterocolitis

- demonstrate the ability to evaluate treatment methods critically, and adopt new interventions in neonatology when appropriate.

- demonstrate medical expertise in other areas other than direct patient care

- including teaching, presentations, issues surrounding child apprehension

- demonstrate insight into his/her limitations of expertise by self-assessment.

**Communicator**

- establish a relationship with the infant's family, maintaining confidentiality

- able to deliver information of the infant's condition, diagnosis and progress to the family in a sensitive way, that is appropriate to their level of understanding.

- gather information regarding the parent's beliefs, concerns and expectations for their infant and his/her care

- including appreciation for family beliefs/wishes for aggressiveness of resuscitation, objections to blood transfusion therapy, and feeding methods

- demonstrate cooperation and communication of other members involved in the infant's care ensuring consistent information is subsequently delivered to the family.

- including participation in social/discharge rounds with other consultants, nursing and social work

- demonstrate the ability to give appropriate information to colleagues who are accepting care of the infant

- including comprehensive on-call handover, off-service notes and transfer/discharge summaries

**Collaborator**

- understand the role and limitations of other members of the health care team in the care of newborns and development of new therapies and research ideas

- including an understanding of current research being conducted in neonatal medicine at this centre
- develop an effective community plan for the infant prior to discharge, involving relevant community/allied health professionals.
- involving ongoing Pediatric or subspecialty care, Special Infant follow-up, social work, Healthy Babies program, or Children’s Aid Society as appropriate
- participate in multidisciplinary team meetings
- such as weekly social rounds and discharge planning meetings as required.

Manager

- organize appropriate auxiliary investigations, and justify their use, while understanding the limitation of such tests.
- formulate a treatment plan, justifiable on clinical evidence that considers the resources available.
- organize his/her time to balance all the priorities involved: patient care, self-directed learning and administrative duties

Health Advocate

- identify the factors that placed the infant at risk for subsequent medical issues
- including risks for neurodevelopmental sequelae, recurrent infections and chronic lung disease
- arrange follow-up surveillance for individual infants assessed to be at risk
- specifically including Special Infant follow-up, Child Developmental Centre or subspecialty referral as appropriate
- support families by advocating to government and/or community agencies to provide for infant's needs
- including funding applications for Assistive Devices Program, Community Care and Children with Special Disabilities programs

Scholar

- critically appraise current treatment practices based on current literature
- including involvement in Journal Club discussions, held regularly during Neonatal Conference
- identify areas of weakness and develop a plan of ongoing education
- including learning issues identified during work rounds, or patient problems.

Professional

- demonstrate understanding of the ethical implications of newborn care
- particularly in areas of resuscitation of the extremely premature infant, withdrawal of support and dealing with lethal conditions.
- act in a manner that is sensitive to the needs of patient/family, maintaining confidentiality, and balancing personal and professional roles.
- continuously self-evaluate knowledge and performance, and develop a self learning strategy to maintain and advance competence.

Revised September 2004
Dr. Melanie Jaeger
C. Pulmonary Medicine

Coordinator: Dr. Mike Fitzpatrick
To achieve the following goals and objectives, Residents will complete a two month rotation in Respiratory Medicine at Queen’s University, or some equivalent program. In Kingston, anaesthesia residents will function as senior medical residents during their 2 month rotation. They will be responsible for patients referred for consults, working in three respirology clinics per week, performing bronchoscopies, spending ½ day per week in the Pulmonary Function Lab, and attending 2 Neuromuscular clinics during the 2 month rotation.

Goal:
The resident will assess, preoperatively, patients with pulmonary disease. Using clinical and laboratory techniques, the resident will diagnose the disease and its extent and also be able to outline a plan of management to improve the patient's condition preoperatively. In achieving these objectives the resident will know the indications for, and methods of interpretation of chest x-ray; electrocardiogram; pulmonary function tests; and arterial blood gas analysis. It is also anticipated that the resident will demonstrate skill with the use of the fibreoptic bronchoscope.

Objectives:

Medical Expert

The resident will:

1. be familiar with the basic science objectives for the pulmonary system outlined elsewhere.
2. diagnose, treat and investigate a patient with obstruction to air flow at any point in the pulmonary tree.
3. diagnose, investigate and treat the patient with restrictive pulmonary disease.
4. investigate and treat the patient with pulmonary vascular disease.
5. differentiate the various causes of pulmonary hypertension.
6. discuss the common abnormalities of control of breathing and the current treatment.
7. be able to discuss, diagnose and treat diseases of the pleural space.
8. be familiar with the current theories of immunologic lung disease and asthma. The resident will outline a plan of management for patients with asthma and status asthmaticus.
9. discuss the pathogenesis, pathology, and pathophysiology of the patient with lung cancer. The resident will be able to recognize the frequent concurrence of other lung disease with lung cancer and will be able to evaluate the response of the patient with lung cancer to surgery. The resident will also be able to discuss the paraneoplastic syndromes.
10. diagnose and treat common respiratory infections. The resident will be able to recognize the different susceptibility of the immunocompromised host. The resident will be familiar with the pharmacology of the commonly used antibiotic drugs.
11. develop skill in handling the fibreoptic bronchoscope. The resident will be able to identify the first three divisions of the major bronchi.
12. assess and quantitate the risk associated with a variety of respiratory disorders in patients who are going to have a surgical procedure.

Communicator

1. The resident must be able to effectively communicate with the patient and their family regarding all aspects of their care. This includes being able to put the patient at ease as well as eliciting all necessary information from the patient.
2. The resident will be able to communicate effectively with other specialty services regarding respirology patients.
3. The resident will be able to perform complete consultations and communicate their concerns and issues in writing as well as verbally.
4. The resident will know when consultation with other services is required and in the best interest of the patient.
5. The resident will document clearly, concisely and legibly all aspects of their involvement with the patient.

Collaborator

1. The resident will strive to involve other medical subspecialties when necessary, as well as other allied health professionals in order to better care for their patients.
2. The resident will interact with other physicians and health professionals in a mature, respectful and professional manner.
Manager

1. The resident will manage their time appropriately in order that all patients requiring attention can be seen.
2. The resident will triage and prioritize those patients requiring the most urgent care.
3. The resident will supervise junior residents and medical students appropriately, as well as seek supervision from the attending staff when needed.
4. The resident will delegate certain responsibilities to other team members when necessary and appropriate.

Health Advocate

1. The resident must always be an advocate for the patient, especially when the patient is unable to do so for his/herself.
2. The resident must always ensure that the highest standards of care are practiced, and that all guidelines and policies are adhered to.

Scholar

1. The resident must demonstrate continued self-directed learning in order to improve their patient care.
2. The resident must be able to critically appraise the literature in order to determine the optimal management plans for their patients, while ensuring that their practice is evidence based.
3. The resident will appropriately teach more junior members of the team, while ensuring a high standard of patient care.

Health Professional

1. The resident will demonstrate a mature sense of responsibility for his/her patients and ensure proper hand over of patients to colleagues when he/she is not available.
2. The resident will foster the physician/patient relationship and keep all information in confidence.
3. The resident will demonstrate appropriate ethical insight.
4. The resident will remain calm, confident and efficient when performing under stress.

Revised September 2004
Dr. Melanie Jaeger
**D. Cardiology**

Coordinator: Dr. James Brennan

**Goal:**
The resident will assess the patient and outline a course of therapy and investigation for a patient with a cardiac problem. The resident will understand the implications of the patient's disease in relation to any anaesthetic or surgical intervention.

**Objectives:**

**Medical Expert**

1. The resident should know the following about the normal heart and blood vessels as they start the cardiology rotation:
   - the embryology of the heart.
   - the anatomy of the heart.
   - the normal physiology of the cardiovascular system.
   - the generation and conduction of the electrical activity in the heart.
   - the mechanism of metabolic regulation within the heart.

2. In examining the heart and the blood vessels, the resident will be able to:
   - take a complete cardiovascular history and physical examination of the heart, peripheral vasculature, precordium, and lungs.
   - interpret the resting electrocardiogram and chest x-ray.
   - assess patients with abnormal myocardial contractility, electrical or conduction abnormalities in the heart, and myocardial ischemia and infarction.

3. Disorders of the cardiovascular system:
   - The resident will diagnose, investigate and manage patients with chest pain.
   - The resident will describe the pathophysiology of heart failure. The resident will diagnose, investigate and treat heart failure.
   - The resident will discuss the pathophysiology of hypotension and shock. The resident will describe the physical findings, investigation and management of shock and acute pump failure.
   - The resident will describe the pathophysiology and investigation of high output states.
   - The resident will describe the disturbances of cardiac rhythm and conduction. The resident will describe and investigate mechanisms of arrhythmias and conduction abnormalities. The resident will be expected to manage all common arrhythmias and rhythm abnormalities.
   - The resident will have a clear differential diagnosis and plan of management of the patient with syncope.
   - The resident will describe the mechanisms of sudden death. The resident will discuss the predictors and prevention of sudden cardiac death.
   - The resident will discuss the current standards of cardiopulmonary resuscitation.

4. Disease of the heart and blood vessels:
   - The resident will describe the common forms of congenital heart disease. The resident will describe the physical findings, electrocardiograph, and x-ray appearances of the common congenital heart lesions. The resident will understand the anaesthetic implications of these lesions whether the patient is for surgical cure or incidental surgery.
   - The resident will describe the history, physical findings, investigation and current management of patients with:
     - rheumatic fever
     - aortic valve disease
     - mitral valve disease
     - tricuspid and pulmonary valve disease
   - The resident will also understand the anaesthetic implications of these disorders.

5. Coronary Artery Disease:
The resident will understand the factors influencing atherogenic heart disease, cholesterol metabolism, and prevention of coronary atherosclerosis.

The resident will understand the pathophysiology and investigation of angina pectoris, myocardial infarction and other manifestations of myocardial ischemia.

The resident will discuss the diagnosis and treatment of nonatherosclerotic coronary artery disease including coronary artery spasm.

**Systemic arterial hypertension.** The resident will understand the pathophysiology of hypertension. The resident will describe a plan of investigation and management to the hypertensive patient. The resident will outline the anaesthetic implications of hypertension.

**Pulmonary Hypertension.** The resident will discuss the investigation, diagnosis and treatment of primary pulmonary hypertension, pulmonary embolism, pulmonary infarction, acute cor pulmonale and chronic cor pulmonale.

The resident will discuss the pathophysiology, investigation, treatment and complications of bacterial endocarditis. The resident will also be familiar with commonly used protocols for prophylaxis of bacterial endocarditis.

The resident will be familiar with myocardial disease. The resident will diagnose, treat and investigate cardiomyopathies.

The resident will diagnose, manage and treat the patient with acute and chronic pericardial disease.

The resident will describe the effects of trauma on the heart.

The resident will describe the diagnosis, investigation and treatment of patients who have peripheral vascular disease. The resident will describe the current management of aneurysms of the aorta. The resident will describe the physical findings, investigation and treatment of patients who have peripheral venous disease.

6. **The heart and other medical problems:**
   - The resident will describe the changes found in the cardiac system with:
     - Pregnancy
     - aging
     - obesity
     - chronic renal failure
     - electrolyte disturbances
     - stress

7. The resident will be familiar with the following techniques and therapeutic procedures. The resident will describe the indications for each intervention and be able to interpret at a basic level the data generated from these techniques. The resident will discuss the complications of these techniques:
   - electrocardiography
   - exercise test
   - Holter monitoring
   - His bundle electrocardiography
   - cardioversion
   - techniques for insertion of perivenous and epicardial pacemakers
   - echocardiography and Transesophageal echocardiography (TEE)
   - cardiac catheterization
   - Swan-Ganz catheterization
   - intra-aortic balloon augmentation of cardiac output
   - cardiopulmonary bypass
   - percutaneous transluminal coronary angioplasty

8. The resident will describe the indications for cardiac pacing. The resident will discuss the various forms of cardiac pacemakers. The resident will discuss the anaesthetic complications of pacemakers during surgery.

9. The resident will be able to assess cardiac patients pre-operatively for non-cardiac surgery and be able to order appropriate investigations as well as optimize patients for surgery.

**Communicator**
6. The resident must be able to effectively communicate with the patient and their family regarding all aspects of their care. This includes being able to put the patient at ease as well as eliciting all necessary information from the patient.
7. The resident will be able to communicate effectively with other specialty services regarding cardiology patients.
8. The resident will be able to perform complete consultations and communicate their concerns and issues in writing as well as verbally.
9. The resident will know when consultation with other services is required and in the best interest of the patient.
10. The resident will document clearly, concisely and legibly all aspects of their involvement with the patient.

**Collaborator**

10. The resident will strive to involve other medical subspecialties when necessary, as well as other allied health professionals in order to better care for their patients.
11. The resident will interact with other physicians and health professionals in a mature, respectful and professional manner.

**Manager**

5. The resident will manage their time appropriately in order that all patients requiring attention can be seen.
6. The resident will triage and prioritize those patients requiring the most urgent care.
7. The resident will supervise junior residents and medical students appropriately, as well as seek supervision from the attending staff when needed.
8. The resident will delegate certain responsibilities to other team members when necessary and appropriate.

**Health Advocate**

12. The resident must always be an advocate for the patient, especially when the patient is unable to do so for his/herself.
13. The resident must always ensure that the highest standards of care are practiced, and that all guidelines and policies are adhered to.

**Scholar**

4. The resident must demonstrate continued self-directed learning in order to improve their patient care.
5. The resident must be able to critically appraise the literature in order to determine the optimal management plans for their patients, while ensuring that their practice is evidence based.
6. The resident will appropriately teach more junior members of the team, while ensuring a high standard of patient care.

**Health Professional**

5. The resident will demonstrate a mature sense of responsibility for his/her patients and ensure proper hand over of patients to colleagues when he/she is not available.
6. The resident will foster the physician/patient relationship and keep all information in confidence.
7. The resident will demonstrate appropriate ethical insight.
8. The resident will remain calm, confident and efficient when performing under stress.
E. Transfusion Medicine

Coordinator: Dr. Lois Shephard

Goals:
The four week rotation will provide in depth exposure to the practical aspects of blood banking. Residents will develop an understanding of the day to day work involved in transfusion medicine, the resource issues with respect to supply and demand, and will develop a better appreciation of the utilization of these resources appropriately.

Objectives:
A. The resident will be able to understand and discuss the following topics:
1. The basis of blood compatibility, and the principles and method of typing and cross matching blood.
2. The preparation of various components, their content, and availability.
3. The clinical indications for specific component therapy including red cell concentrates, fresh frozen plasma, albumin, platelet concentrates, cryoprecipitate, and specific factor concentrates.
4. The risks including those of transmissible disease associated with the use of blood products.
5. The basis for adverse reactions to blood products and the investigations required once an adverse reaction has been suspected.
6. The specific transfusion needs in settings such as massive transfusion, neonatal and paediatric requirements, inpatients requiring multiple long-term transfusions.
7. The recommendations of both the Krever Interim and Final Report and the current guidelines for the use of the blood products in transfusion medicine.
8. The issues around autologous and directed donor programs and the alternatives to allogeneic blood transfusions.

B. The resident will cover the following topics during the blood transfusion rotation:
- Organization
- Records
- Typing, ABO and rhesus
- Antibody Screening
- Direct Coombs
- Cross Matching
- Antibody Detection
- Quality Assurance
- Elutions
- Autoimmune Haemolytic Anaemias
- Antibody Problems
- Transfusion Reactions
- Blood Component Therapy
- Neonatal Transfusion Reactions
- Autologous Blood Transfusion Program
C. The resident will be required to do a short quality assurance project relating to transfusion issues. Such a project should be designed in conjunction with the head of the Anesthesiology Quality Assurance coordinator.

Resource Material:
Resource material is available in the blood bank. Bench time will be made available to residents to gain practical experience if desired and have an opportunity to interact with the transfusion medicine staff. The physicians involved in the day to day running of the blood bank will be available throughout the rotation for ongoing discussions of any of the above issues.

F. Nephrology

Goals:
Residents should be able to relate how their increased knowledge of renal pathology and pathophysiology impacts on anaesthetic management and patient care.

Objectives:

Medical Expert

1. Residents will be able to discuss the pathophysiology and diagnosis, and demonstrate skill in the management of the following disorders:
   - Acute and chronic renal failure
   - Proteinuria
   - Haematuria
   - Primary and secondary hypertension
   - Fluid, electrolyte and acid-base disturbances
   - Poisoning

2. Residents will be familiar with the indications for and the management of:
   - Haemodialysis
   - Peritoneal dialysis
   - Ultrafiltration
   - Haemoperfusion
   - Renal transplantation

3. Resident will be able to discuss:
   - The pharmacology of diuretics
   - The change in pharmacokinetics of anaesthetic, cardiac, respiratory medications with impaired renal function
   - Continuous renal replacement therapy

4. The resident should be able to evaluate renal patients pre-operatively and be able to optimize them for surgery as well as order appropriate investigations.

5. The Resident should be able to perform and interpret a urinalysis.

6. The Resident should exhibit expertise in placement of double lumen central dialysis lines.

Communicator

1. The resident must be able to effectively communicate with the patient and their family regarding all aspects of their care. This includes being able to put the patient at ease as well as eliciting all necessary information from the patient.

2. The resident will be able to communicate effectively with other specialty services regarding nephrology patients.

3. The resident will be able to perform complete consultations and communicate their concerns and issues in writing as well as verbally.

4. The resident will know when consultation with other services is required and in the best interest of the patient.

5. The resident will document clearly, concisely and legibly all aspects of their involvement with the patient.
Collaborator

1. The resident will strive to involve other medical subspecialties when necessary, as well as other allied health professionals in order to better care for their patients.
2. The resident will interact with other physicians and health professionals in a mature, respectful and professional manner.

Manager

1. The resident will manage their time appropriately in order that all patients requiring attention can be seen.
2. The resident will triage and prioritize those patients requiring the most urgent care.
3. The resident will supervise junior residents and medical students appropriately, as well as seek supervision from the attending staff when needed.
4. The resident will delegate certain responsibilities to other team members when necessary and appropriate.

Health Advocate

1. The resident must always be an advocate for the patient, especially when the patient is unable to do so for his/herself.
2. The resident must always ensure that the highest standards of care are practiced, and that all guidelines and policies are adhered to.

Scholar

1. The resident must demonstrate continued self-directed learning in order to improve their patient care.
2. The resident must be able to critically appraise the literature in order to determine the optimal management plans for their patients, while ensuring that their practice is evidence based.
3. The resident will appropriately teach more junior members of the team, while ensuring a high standard of patient care.

Health Professional

1. The resident will demonstrate a mature sense of responsibility for his/her patients and ensure proper hand over of patients to colleagues when he/she is not available.
2. The resident will foster the physician/patient relationship and keep all information in confidence.
3. The resident will demonstrate appropriate ethical insight.
4. The resident will remain calm, confident and efficient when performing under stress.

Revised September 2004
Dr. Melanie Jaeger
G. Palliative Care

Anesthesia residents may take the opportunity to perform a rotation(s) in palliative medicine during their residency which will allow for a broad exposure to the care of terminally ill patients along with their numerous and often times challenging problems. Due to the nature of the work in palliative care, the resident will find that many of the skills required to perform effectively during this rotation are very well representative of the goals and objectives associated with the Canmeds roles as established by the Royal College of Physicians and Surgeons of Canada.

Goals and Objectives

The specialist trainee must be able to …

Medical Expert
- demonstrate diagnostic and therapeutic skills for ethical and effective patient care
- access and apply relevant information to clinical practice
- demonstrate effective consultation services with respect to patient care, education and legal opinions

Symptom management

Pain
- how to assess and treat different types of pain and pain syndromes associated with cancer.
- the current theories on how cancerous growth excites a pain response.
- the pharmacology of NSAIDs, opioids and adjuvant drugs used in the treatment of pain.
- about tolerance, physical dependence, addiction and routes of administration of opioids, especially morphine, hydromorphone and methadone.
- about non-pharmacologic approaches to pain management including anesthetic and surgical options.
- demonstrate a clear understanding of the various interventional pain treatment options which includes indications, contraindications and complications.

Dyspnea, Delirium, Nausea and Vomiting, Constipation, Bowel Obstruction, Decubitus ulcers, Anxiety, Depression, etc.
- what is currently known about the pathophysiology and treatment of these different symptoms.
- the common syndromes associated with cancer.

Emergencies
- the management of hypercalcemia, severe dyspnea, severe pain, spinal cord compression, SVC syndrome, pathologic fractures, seizures and hemorrhage in the palliative setting.

Communicator
- Establish therapeutic relationships with patients/families
- Obtain and synthesize relevant history from patients/families/ communities
- Listen effectively
- Discuss appropriate information with patients/families and the health care team

Psychosocial issues

Communication
- different techniques and approaches for communicating distressing information to patients/families.
- to work in an interdisciplinary team with participation in rounds, team and family conferences and death reviews.
- to work with patients and families to determine appropriate goals of treatment for stage of disease.

Patient and Family Care
- issues related to outpatient management and management of symptoms in a home setting.
- cultural/spiritual issues and alternative/unorthodox therapies as they relate to the palliative care situation.
- issues related to bereavement of families and caregivers, including management of grief.

Collaborator
- consult effectively with other physicians and health care professionals
- contribute effectively to other interdisciplinary team activities
Consultation
- demonstrate timely and appropriate consultation skills directed towards various medical specialties including oncology, interventional radiology, orthopedics as well as others.

Multidisciplinary rounds
- participate effectively in the numerous multidisciplinary rounds that are organized on a regular basis.
- recognize the importance of the contributions from various paramedical, psychosocial and spiritual experts.

Manager
- utilize resources effectively to balance patient care, learning needs, and outside activities
- allocate finite health care resources wisely
- work effectively in a health care organization
- utilize information technology to optimize patient care, life-long learning and other activities

Resource allocation
- demonstrate an understanding of the organization of a well established tertiary care palliative care service which includes home care, outpatient clinics and hospital in patient care.
- collaborate effectively with the various care coordinators in order to ensure that resources are used as efficiently as possible.

Health Advocate
- identify the important determinants of health affecting patients
- contribute effectively to improved health of patients and communities
- recognize and respond to those issues where advocacy is appropriate

Health advocacy
- understand through observation the important role the physician plays at various levels of hospital administration and governments in the role of health advocacy for patients.

Scholar
- develop, implement, and monitor a personal continuing education strategy
- critically appraise sources of medical information
- facilitate learning of patients, house staff/students and other health care professionals
- contribute to development of new knowledge

Medical information
- demonstrate effective skills and techniques necessary to acquire information related to patient care from various sources including the library and internet based searches.
- will have the opportunity to present in an informal setting a topic of interest that is relevant to the delivery of palliative care.

Professional
- deliver the highest quality of care with integrity, honesty, and compassion
- exhibit appropriate personal and interpersonal professional behaviours
- practise medicine ethically consistent with obligations of a physician

Ethics
- will be exposed to numerous ethical issues that will require careful attention and skill in order to manage these issues effectively.

Compassion
- recognize as with all areas of medicine the delivery of compassionate care is tantamount however during the terminal phase of illness, these skills are of particular importance.
The above list of goals and objectives is not meant to be exhaustive. The resident will truly find a rotation in palliative medicine to be challenging and professionally stimulating. The professional attitudes skills and behaviours acquired and improved upon will assist in developing a well rounded and appropriately trained anesthesiologist.

Evaluation

Residents/Fellows will be evaluated on their assessment and care of the patients (both in- and outpatients), relationships with patients, families and interdisciplinary team members. Attendance at twice weekly Journal Club sessions and Pain and Symptom Clinics is compulsory. The trainee will be required to review at least one article for Journal Club. Attendance at weekly Palliative Care Rounds is encouraged.

Revised September 2004
JL
Section VII:
Evaluation of the Goals and Objectives in the Postgraduate Program in Anesthesiology

Overview of Academic Program

Sections I to VI of this booklet, outline the various Goals and Objectives necessary to become a competent anesthesiologist. Section V (Block Objectives) indications how the residents will be assessed during each block rotation. This section presents the overview (above) of the program and how various academic activities are assessed.

Daily Evaluations and Block Rotation evaluations are discussed in some depth in the Resident Handbook. In the next couple of years, more extensive use of MCQ’s will be used to evaluate resident knowledge as residents progress through the program.

Attempts will be made to continue to keep evaluative procedures as valid and reliable as possible. The following pages outline the forms used in assessing progress as residents move through the program.

September 2004
# EVALUATIONS

## Resident Daily Evaluation Form

Resident: ___________________________  PGY: ________  Date: _____________

Staff: ___________________________  Room: _____________

<table>
<thead>
<tr>
<th>Area</th>
<th>Unacceptable*</th>
<th>Below Expectations*</th>
<th>Meets Expectations</th>
<th>Above Expectations</th>
<th>Outstanding</th>
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<tbody>
<tr>
<td>Knowledge base</td>
<td></td>
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<tr>
<td>Judgement/Problem solving</td>
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<td>Pre-operative assessment</td>
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<tr>
<td>Emergency management</td>
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<tr>
<td>Technical Skills</td>
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<tr>
<td>Thoroughness of patient care and follow-up</td>
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<tr>
<td>Patient interaction</td>
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</tr>
<tr>
<td>Record keeping/charting</td>
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<tr>
<td>Collaboration with surgeons/nurses and other services</td>
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<tr>
<td>Organization</td>
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<td>Teaching skills</td>
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<tr>
<td>Sense of responsibility</td>
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<tr>
<td>Insight/self-assessment</td>
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</tbody>
</table>

Comments:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Please comment on any other aspects ie: **critical incidents**, managerial skills, ethics, learning points, scholarly activity etc:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Is this resident where he/she should be for their level of training?

Below ______  Marginal ________  Meets expectations ________  Exceeds expectations ________

Discussed with resident?  Yes ________  No ________  (Please discuss* areas)

Staff Signature ___________________________
Staff Daily Evaluation Form
(to be filled out by Resident at the end of the day)

Staff: ___________________  Resident: ___________________

List: ___________________  Date: _____________________

present (available)

prepared (attitude to teach)

plans (objectives defined - what?)

procedures (new skills encouraged)

productive (good feedback, teaches - what?)

professional (positive, good role model)

Overall, how well did the staff meet your expectations in all areas
(Please circle your choice)

Rarely  Inconsistently  Generally Meets  Sometimes Exceeded  Consistently Exceeded

Additional Comments:
## Resident Evaluation of Program

### Dates:

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>2</td>
<td>5</td>
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<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Overall, the program is meeting my expectations
Comments:

The knowledge component is well covered as far as:
- The basic sciences
- The clinical sciences
Comments:

I receive appropriate opportunities to acquire clinical skills:
Comments:

I receive appropriate instruction in clinical skills
Comments:

I receive enough feedback daily on how I am progressing
Comments:

I value the feedback that I receive from all the faculty:
Comments:

I especially value the feedback that I receive from the following faculty:

1. __________________
2. __________________
3. __________________

I receive the appropriate amount of clinical supervision:
Comments:

Aspects of the residency program that I would like to see improved at this time are:

1. ____________________________________________
2. ____________________________________________
3. ____________________________________________

Aspects of the residency program that are particularly good at this time are:

1. ____________________________________________
2. ____________________________________________
3. ____________________________________________

If you have important concerns that are not covered in the above questionnaire, please speak to Dr. Melanie Jaeger.

* Please Return to Kim Asselstine *
## Can MEDS Roles

<table>
<thead>
<tr>
<th>Category</th>
<th>Descriptors</th>
</tr>
</thead>
</table>
| Medical Expert | • Demonstrate diagnostic and therapeutic skills for ethical and effective patient care  
|                | • Access and apply relevant information to clinical practice  
|                | • Demonstrate effective consultation service with respect to patient care education and legal opinions                                   |
| Communicator   | • Establish therapeutic relationship with patients/families  
|                | • Obtain and synthesize relevant history from patients/families/communities  
|                | • Listen effectively  
|                | • Discuss appropriate information with patients/families and the health care team                                                          |
| Collaborator   | • Consult effectively with other physicians and health care professionals  
|                | • Contribute effectively to other interdisciplinary team activities                                                                        |
| Manager        | • 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 information technology to optimize patient care, life-long learning and other activities                                         |
| Health Advocate| • Identify the important determinants of health affecting patients  
|                | • Contribute effectively to improved health of patient and communities  
|                | • Recognize and respond to those issues where advocacy is appropriate                                                                       |
| Scholar        | • Develop, implement and monitor a personal continuing education strategy  
|                | • Critically appraise sources of medical information  
|                | • Facilitate learning of patient, house staff/students and other health professionals  
|                | • Contribute to development of new knowledge                                                                                               |
| Professional   | • Deliver highest quality care with integrity, honesty and compassion  
|                | • Exhibit appropriate personal and interpersonal professional behaviours  
|                | • Practise medicine ethically consistent with obligations of a physician                                                                   |

**Resident’s comments:** ________________________________________________________________

**Program Director’s comments:** _______________________________________________________

**Date discussed with Resident:** _______________________________________________________

**Program Director’s Signature & Date** __________________________  **Resident’s Signature** __________________________
Appendix A: Ancillary Objectives of the Postgraduate Program in Anesthesiology

1. **Professional Skills:**
   a. **Statistics**
   Given the ongoing nature of professional development, the resident will understand the basic concepts of statistical analysis and clinical design in order to assess and critically review the anaesthetic literature.

   **Objectives:**
   - Gain an understanding of the basic concepts and methodology of statistical analysis and clinical study design.
   - The resident will assess and critically review clinical studies related to anaesthesia.
   - Achieve fluency with the concepts of:
     - Total population vs. sample population.
     - Types of clinical data: continuous, nominal, ordinal.
   - Understand the meaning of:
     - central tendency - mean, median, mode
     - range, variance, standard deviation
     - sensitivity, specificity, incidence, prevalence
     - positive predictive value, negative predictive value, odds ratio, sample size analysis
     - Experimental Design: prospective, retrospective, randomization, protocol development
   - Understand the derivation and limitations of simple probability statements.
   - Appreciate the normal (Gaussian) distribution curve and:
     - Factors influencing its shape
     - central limit theorem
     - confidence intervals
     - standard error of the mean
   - Study design.
     - concept of randomization
     - single and double blind studies
     - selection bias
     - confounding variables
     - null hypothesis
     - P-values
   - Significance testing
     - T-test
     - chi-square tests
     - the appropriate tests as related to type of data
     - one-tail vs. two-tail testing
     - linear regression and correlation

b. **Critical Appraisal**
   The resident will develop skills to facilitate the critical review and acquisition of new information, and acquire the habit of continuous study.

   **Objectives:**
   - evaluate one's own capabilities and limitations.
   - demonstrate a desire for continuous improvement in areas of limitations.
   - maintain an inquisitive attitude.
   - appreciate the need for investing time and effort to expand knowledge and skills constantly.
• accept responsibility for participation in activities which further good patient care and are necessary for 
administration of patient care facilities.

The resident will have knowledge of the purpose of research and familiarity with the use of reference material in 
managing clinical problems.

Objectives:
• list those parts of a journal article that should be skimmed to determine whether study in depth is appropriate.
• list indications for detailed study of the 'methods' section of a journal article.
• demonstrate ability for finding answers to questions via literature search and review.
• demonstrate ability to formulate a research plan to answer questions.

The resident will have a basic knowledge of statistics sufficient to draw appropriate inferences from presented data 
(e.g., journal articles).

Objectives:
• define hypothetical and proven relationships among measurable variables.
• differentiate between measurable variables that are correlated and those that are causally linked, and give examples.
• explain what is meant by false correlation by virtue of mutually correlated variables.
• list and define measures of central tendency and variability.
• distinguish between continuous and discontinuous variable, and given an appropriate statistical test of significant 
difference for each type.
• discuss the level of significance (p) and its proper use.

c. Ethics

Objectives:
• The resident will have sufficient knowledge of ethics to be able to discuss the basic principles of:
  - Autonomy
  - Beneficence
  - non-maleficence
  - justice
• The resident will be able to define the following terms:
  Teleological
Deontological
• The resident will be able to discuss how to best resolve issues created when there is a conflict of interest between 
different ethical systems based on different cultural and religious values.
• The resident will be able to discuss:
  - the approach to discussing/framing an ethical argument.
  - common areas of ethical conflict in anaesthesia such as:
    - duty to report colleagues
    - Informed consent
    - Surgical/anaesthetic patient refusal
    - Limited consent (models of autonomy vs beneficence) age (children) mental competence, 
      substitute decision making
    - coercion vs persuasion
  - Duty of Care:
    - the physician-patient "contract"
    - the patient dangerous to the physician (AIDS, Hep B, violence)
    - confidentiality
  - Allocation of resource issues
  - End of Life concerns:
    - Brain death
    - with-holding/withdrawing treatment
    - Advance Directives/Living Wills
    - no blood
d. Legal issues

Objectives:
The resident will know the legal requirements concerning:

- Informed consent
  - Disclosure of risk
  - Laws re: consent
  - Substitute decision makers
- The resident will understand what constitutes malpractice in Torts law. This will include the concept of duty of care and the definition of negligence.
- The resident will know how to avoid law suits and how to handle the threat of a law suit including information about
  - how CMPA works on a doctor’s behalf
  - the usual course of a law suit
  - responsibility of the resident vs the staff anaesthetist
  - what to do when the resident disagrees with the actions of the staff person
- The resident will know the legal concerns re:
  - Confidentiality
  - Hospital bylaws
  - Statutory reporting of diseases or malpractice
- The resident will be familiar with the main concerns of the Coroners Act

e. Continuous quality improvement

Given a Department of Anaesthesia with no formal quality assurance/quality improvement programme, the resident will be able to create a system of quality monitoring and improvement for the department.

Objectives:

- The resident will define the components of Quality Assurance (Structure, Process and Outcome) and give specific examples of each.
- The resident will be able to describe the applicability, advantages and disadvantages of the following methods of quality assurance: medical audit, utilization studies, post-mortem studies and peer review.
- The resident will define the principles behind the terms Quality Improvement and Total Quality Management and will differentiate between these and Quality Assurance.
- The resident will understand the reasons for failure of quality programmes and common problems associated with such programmes.
- During his/her residency, the resident will have demonstrated first hand experience with two of the above methods (either as a Resident Day project or at Department Rounds).
- The resident will describe the methods of technical Quality Control required in a large hospital anaesthetic department.
- The resident will be able to describe the structure of a hospital QI plan, the function of the QI committee, the role of department head, and the role of individual department members.

f. Teaching and communication skills

Objectives: Teaching and Learning skills

- Residents will participate in the TIPS course to learn how to improve their presentation skills while giving rounds (& larger lectures). They will be able to use Objectives and prepare better slides & overheads.
- Residents will acquire knowledge of teaching principles through TIPS and by observation of the teaching techniques of the staff such that they can undertake one-to-one teaching with students and junior house staff.
Residents should gain experience with teaching small groups as well as learn how to give feedback. Residents are encouraged to begin to understand some of the principles of evaluation.

- Learning skills must be developed during the residency that will lead to continuous learning (ongoing CME) after finishing a residency.
- Residents must be familiar with the current efforts to show continued competence through programs administered by RCPSC and CPSO.
- Residents should demonstrate an organized study pattern involving regular organized study & reading.
- Residents should be familiar with conducting their own computerized literature searchers.

Objectives: Communication skills

- Residents should demonstrate during their daily interaction with patients that they are effective at communication with both patients and families. Residents should demonstrate effective interviewing techniques and information-giving skills.
- Residents should be sensitive to determining how information is received when breaking bad news to patients.
- The resident should be able to communicate effectively with colleagues, nurses, hospital employees and when necessary, convey a sense of urgency without causing a decompensating increase in tension in an urgent situation.
- Residents should be able to manage disagreement when it exists between colleagues and co-workers by the effective use of feedback and communication skills.

2. Personal Attitudes and Ethics for the Resident and Practicing Anesthesiologist

The following objectives further clarify desirable attitudes and ethical stances found in anesthesiologists during their training and subsequently as independently practicing physicians.

1. Personal Feelings:

   The resident will relate to surgical patients in an understanding and empathic manner, respect their dignity and individuality, and accept them as participants in decisions regarding their medical care.

Objectives:

- Identify any hostile or punitive feelings toward patients.
- Inquire about and recognize any personal reactions that may be detrimental to the doctor-patient relationship.
- Recognize that personal feelings may alter patient management.
- Explore and accept willingly possible ways of changing detrimental feelings.
- Be aware of one's own values and biases.
- Attempt to be objective and not impose personal biases and values on patients.

The resident will have an awareness of his own identity, capability and responsibility. This awareness will include the personal basis for career choice, rationale for future planning, both professionally and personally, and the significance of family obligation in those choices.

2. Professional Growth

   The resident will accept personal responsibility for continued professional growth, develop skills to facilitate the critical review and acquisition of new information, and acquire the habit of continuous study.

Objectives:

- Evaluate one's own capabilities and limitations.
- Demonstrate a desire for continuous improvement in areas of limitations.
- Maintain an inquisitive attitude.
- Appreciate the need for investing time and effort to expand knowledge and skills constantly.
- Accept responsibility for participation in activities which further good patient care and are necessary for administration of patient care facilities.

   The resident will have knowledge of the purpose of research and familiarity with the use of reference material in managing clinical problems.
Objectives:

- List those parts of a journal article that should be skimmed to determine whether study in depth is appropriate.
- List indications for detailed study of the "methods" section of a journal article.
- Demonstrate ability to find answers to questions via literature search and review.
- Demonstrate ability to formulate a research plan to answer questions.

The resident will have a basic knowledge of statistics sufficient to draw appropriate inferences from presented data (e.g., journal articles).

Objectives:

- Define and differentiate between hypothetical and proven relationships among measurable variables.
- Differentiate between measurable variables that are correlated and those that are causally linked, and give examples.
- Explain what is meant by false correlation by virtue of mutually correlated variables.
- List and define measures of central tendency and variability.
- Distinguish between continuous and discontinuous variables, and give an appropriate statistical test of significant difference for each type.
- Discuss the meaning of level of significance (p) and its proper use.

3. Teaching Responsibilities

The resident will assume responsibility for teaching colleagues, including medical students and allied health personnel.

Objectives:

- Accept the responsibilities of a teacher.
- Strive continuously to improve teaching skills.
- Use appropriate teaching methods.
- Maintain up-to-date medical information.

4. Interpersonal Communication Skills

The resident will establish effective interpersonal relationships with the patient, the patient's family, and other health personnel.

Objectives:

- Establish and maintain rapport with patients and other involved persons by:
  - accepting diverse personalities, interests, and values;
  - taking time to listen, hear, and understand what the patient is feeling as well as what is being said;
  - being nonjudgmental concerning actions, plans and values that are different from one's own;
  - avoiding condescending and superior behaviours
- Be sensitive to patients' fears, anxieties, and needs for privacy.
- Explain in a clear and concise way:
  - diagnosis and management to the patient and family in language they understand;
  - management plans in a manner that motivates and facilitates patients' willing participation;
  - management plans to nurses and other members of the health care team in such a way as to insure their effective participation;
  - steps necessary for managing problems when serving as a consultant to another physician.

5. Ethics

The resident will demonstrate responsibility to the community to improve medicine through a personal example of professional excellence, self-discipline, and human concern, even at personal sacrifice.

Objectives:

- Demonstrate personal responsibility to patients by availability, confidentiality, and respect for the patient's physical and emotional comfort.
- Demonstrate adherence to the best available practice, including referral to other qualified practitioners.
• Discuss the ethics of human experimentation, and discuss the resolution of conflict between research and the patient's interests.
• Demonstrate meticulous accuracy in reporting clinical and scientific information.
• Pursue measures to develop the highest quality of medical care commensurate with the circumstances of the environment.

The resident will state his position on an issue of medical ethics, explaining the physician's responsibilities as a passive observer of potential unethical practice or behavior, and explaining the physician's responsibilities when personally and directly involved in such a situation.

Objectives:
• the aging physician and changing competence
  - the incompetent anaesthetist
  - Discuss each of the following ethical situations with regard to the above statements:
  - the disabled physician

6. Team Participation
The resident will be aware that effective health care delivery requires the collaborative efforts of many health care professionals, including nurses, respiratory therapists, pharmacists, and support staff.

Objectives:
• Demonstrate an understanding and respect for the roles and capabilities of other health care personnel in providing optimum medical care.
• Request and provide consultation when appropriate.
• Maintain open communication when appropriate.
• Function effectively as a team leader or team member, as the situation warrants.

7. Record System
The resident will develop a record-keeping system to assist with diagnosing medical problems, managing treatment, and assessing quality of care.

Objectives:
• Demonstrate ability to record concisely significant findings on history and physical exam.
• Demonstrate clarity in problem formulation and planning management.
• Relate in the record the clinical rationale for requested laboratory procedures.
• Maintain a clear set of therapeutic objectives for the use of other members of the health care team.
• Demonstrate promptness in completing the record, including immediate dictation of operative and clinical discharge summaries.
• Recognize the importance of determining priority of effort with respect to a series of problems.
• Maintain an individual record of patient care and procedures for self evaluation and assistance in maintaining continuity of care.
• Use flow sheets and data summaries in complex multiple system problems.
Basic Science Objectives
of the Postgraduate Program in Anesthesiology

1. Physics:
The resident will know the physical laws that affect the delivery and monitoring of anaesthetics.

Objectives: The resident will know the common measurement units and their usual values, the physiologic monitoring devices, factors affecting their performance, and reliability.

i. Measurement
1. Measurement Units
   a. S.I. units
      - base
      - derived
   b. Non S.I. units: i.e. mmHg, standard atmosphere

2. Pressure: Units and Definition (F/A)
   a. Direct Measurement
      - liquid manometers
      - bourdon gauge
      - aneroid gauge
      - electromechanical: catheter-transducer system
         - transducers:
            - wheatstone bridge
            - principles of function
         - catheter-transducer system
            - criteria for accurate reproduction of pressure wave form
            - frequency response: natural frequency
            - resonance and damping
   b. Indirect Measurement
      - Sphygmomanometry with detectors
         - palpation
         - auscultation
         - Doppler
         - oscillotonometry

3. Gas Volumes: Principles and Methods of Application
   a. Spirometry
   b. Inert gas dilution
   c. Plethysmography

4. Gas Flow
   a. Variable orifice / constant pressure flowmeters
      - rotameter
      - peak expiratory flow meter
   b. Variable pressure / constant pressure flowmeters
      - pneumotachograph
      - bourdon gauge flowmeters

5. Gas Analysis
   a. Oxygen only i.e. O₂ analysers
      - electrochemical
         - galvanic or fuel cell sensor
- polarographic cell sensor (Clark electrode)
  - paramagnetic analysis
b. Carbon dioxide only i.e. capnometry and capnography - infrared analyser, acoustic resonance, Ramon scattering
  - flow-through devices
  - aspiration devices
c. anesthetic gas analysers (i.e. ultraviolet)
d. mass spectrometry
e. major pitfalls in ETCO₂ interpretation

6. pH and Blood Gas Analysis
   a. pH, pCO₂, P0₂ electrodes: principles of function
   b. sources of error in blood gas determination i.e., collection, transportation, storage, temperature corrections.
c. oximetry: spectrophotometric measurements of 0₂ saturation
d. transcutaneous 0₂ and CO₂ measurement

7. Blood Flow Determination
   a. Indicator techniques: the Fick principle
      - measurement of 0₂ consumption and A-V0₂ content difference to determine cardiac output
      - indicator dilution technique - theoretical basis
        - single injection
        - constant infusion
   b. Electromagnetic flowmeters
   c. Ultrasonic flowmeters

8. Temperature Measurement
   a. non-electrical
      - liquid expansion
      - bimetallic thermometers
   b. electrical
      - resistive wire
      - thermistor
      - thermocouple

9. Measurement of Biological Signals
   a. Brain, i.e. EEG
   b. Spinal cord, i.e. evoked potentials
   c. Peripheral nerves
   d. Myoneural junction (mechanism and EMG response to nerve stimulation)
   e. Heart (EKG)

ii. Physics of Gas Laws:

The resident will know the gas laws and their influence on inhalational agents and respiratory therapy.

1. Mechanics
   - basic and derived S.I. units
   - concepts of force, pressure, tension, resistance, work, energy, etc.

2. Mathematical Concepts
   - Natural exponential functions:
      - time constants
      - half-life

3. Gases: Principles and Application of the following:
   a. Boyle's Charles' law
   b. Avogadro's hypothesis
4. Vaporization
   a. Definition
   b. Concepts of latent heat, boiling point, barometric pressure
   c. Factors affecting vapour pressure

5. Gas solubility: principles and application of:
   a. Henry's law
   b. solubility and partition coefficients (Ostwald coefficients)

6. Diffusion and osmosis
   a. Fick's and Graham's law
   b. osmolality, osmolarity
   c. osmometry

7. Fluid Dynamics
   a. Laminar flow: Hagen-Poiseuille application
   b. Turbulent flow: Reynold's number
   c. Bernoulli effect: principles of the injector or venturi
   d. Laplace law - surface tension
   e. Rheological properties of blood

8. Heat and Humidification
   a. Specific and latent heat
   b. Humidification
      • absolute and relative humidity
      • humidifiers and nebulisers
   c. Heat loss and gain during anesthesia

9. Electricity
   a. Basic terms: applications
      • AC, DC, Ohm's law, capacitance, inductance, impedance, resistance
   b. Recording of biologic potentials
      • Amplifiers
      • electrodes

2. Monitoring, Equipment and Clinical Measurement

Objectives:

1. The resident will understand and use as a basis for anesthesia practice the Standards of Practice, as published in the CAS Guidelines.

2. Anaesthetic Monitors
   Principles of function and sources of error
   • pulse oximetry
   • capnography and gas analysis
   • invasive and noninvasive blood pressure monitoring
   • ECG
   • CVP, PA catheter
   • TEE
• neuromuscular blockade monitor
• EEG and evoked potentials
• temperature monitoring

3. Anaesthetic Gases, Storage and Piping
• Physics
• Safety standards and organization
• Oxygen delivery systems

4. Electricity
• Principles of electrical safety
• Hazards to the patient and anesthesiologist

5. The Anaesthetic Machine
• Principles of operations - flowmeters, vaporizers, and ventilators
• Malfunctions
• Safety features – alarms

6. Ventilators
• Types
• Principles of operation
• Modes of ventilation

7. Circuits
• Physiology and techniques of humidification
• Types of circuits - advantages, disadvantages
• Mapleson Classification of circuits

8. Computers and Anaesthesia
• computerized record keeping

9. Infusion and PCA Pumps
• principles of-function and limitations

10. Cleaning/Sterilization of Equipment

3. Pharmacology
The resident will be able to select pharmacologic agents and delivery systems to achieve therapeutic goals which take into account the patient's pathophysiology, current therapy, and potential interactive toxicities.

Objectives: The resident will study and demonstrate a practical depth of knowledge in the following areas.

General Anesthetics
1. Be familiar with current theories on mechanism of action.

i. General Anaesthetics - Inhalational
1. Be familiar with these concepts and demonstrate knowledge of:
   a. Uptake and distribution.
   • Alveolar concentration vs. inspired concentration.
   • Blood-gas partition coefficients.
   • Influence of changes in ventilation, cardiac output, intrapulmonary shunting.
   • Tissue-blood partition coefficients and time constants.
Factors influencing rate of recovery.
b. Minimal Alveolar Concentration (MAC)
   • Value of concept.
   • Factors affecting its value.
c. Side effects and specific toxicities.
   • Relationship to metabolism.

2. Agents no longer generally used clinically (diethyl ether, chloroform, and cyclopropane).
   • Knowledge of historical development, basic pharmacology and why not currently used.

3. Currently used agents. These include N₂O, alkanes (Halothane) and ethers (Methoxyflurane, Enflurane Isoflurane, sevoflurane and desflurane).
   • Knowledge of basic pharmacology and specific major organ system side effects / toxicity. This would include:
     a. Halothane (?Enflurane) - hepatotoxicity (effects on hepatic blood flow).
     b. Methoxyflurane - nephrotoxicity (effects on renal blood flow).
     c. N₂O
        • Reasons for current malignment of this long-used agent.
        • Problem of diffusion into closed body cavities.
     d. Enflurane - ? cerebral toxicity.
     e. Cardiovascular system effects.
        • Myocardial vs. peripheral.
        • Arrhythmogenicity and "safe" dosage of epinephrine.
        • Affects on conduction system, coronary circulation, and pulmonary and systemic vascular resistance.
     f. Respiratory system effects.
        • Including effects on VQ, hypoxic pulmonary vasoconstriction and ventilatory responses to hypoxia / hypercarbia.
     g. Neuromuscular system effects.
        • Interaction with muscle relaxants.
        • Precipitation of malignant hyperthermia.
     h. CNS effects.
        • Cerebral blood flow, ICP effect on autoregulation.
        • EEG correlation with anaesthetic depth.

ii. General Anaesthetics – Intravenous

Exhibit detailed knowledge of the following drugs especially in the areas outlined:

   a. Basic molecular structure as relates to activity.
   b. Uptake, distribution, metabolism.
   c. Major organ side effects.
      • Cerebral
      • Cardiovascular
      • Respiratory
   d. Contraindications - relative and absolute.

2. Benzodiazepines - Diazepam, Lorazepam, Midazolam.
   a. Use of sedation, induction of anaesthesia and as supplement to anaesthesia.
   b. Uptake, distribution, metabolism, major organ side effects.
   c. Interaction with other drugs.
   d. Flumazenil.

3. Propofol
   a. Basic molecular structure.
   b. Volume of distribution.
c. Metabolism.
d. Side effects (CNS).

4. Narcotics
a. Established agents - Meperidine, Morphine, and Fentanyl.
b. New agents - Alfentanil, Sufentanil, Remifentanil
c. Methadone in pain management.
   • Intrathecal and epidural use.
d. Use as premedicants vs. general anaesthetics.
e. Uptake, distribution, metabolism, duration of action, clinical effect as relates to blood levels.
f. Major differences between agents, particularly in relation to undesirable side effects.
g. Major organ side effects (CNS, CVS, Neuromuscular).
h. Advantages and disadvantages vs. inhalational agents.
i. Reversal by narcotic antagonists including side effects of the latter.
j. Intrathecal and epidural morphine / opioids.
   • Indications
   • Side effects
k. Legal controls on narcotic distribution, use storage and handling.

1. Butyrophenones - Droperidol
   a. Major pharmacological action including effect on CNS and CVS systems.
   b. Use of antiemesis, premedication and supplement to general anaesthesia - appropriate dosage.
   c. Major organ side effects.

2. Ketamine
   a. Cerebral mechanism of action.
   b. Uptake with I.V. vs. I.M. administration, appropriate dosages.
   c. Indications for clinical use.
   d. Major organ side effects.
      • Respiratory
      • CVS - ? safe agent in hypovolemia.
      • CNS - emergence phenomena - incidence and factors that may lessen them.

3. Other antiemetics (antihistamines, phenothiazines, metoclopramide).

iii. Local Anaesthetics

Demonstrate knowledge of:
1. Mechanism of Action
   • Effect of ionization, alkalization, heating.
2. Molecular Structure
   • Amide vs. Ester.
   • Procaine, Tetracaine, Lidocaine, Bupivacaine, Cocaine.
3. Absorption, Distribution Elimination
4. Cm - Minimal concentration necessary for a nerve block
   • Factors affecting this.
5. Allergic Potential
   • Amide vs. Ester.
6. Toxicity as relates to:
   • Recommended doses of each agent.
   • Central Nervous System.
   • Cardiovascular System (are some LAs more cardiotoxic?)
   • The patient at risk of toxicity.
7. Treatment of Toxicity

iv. Neuromuscular Blocking Drugs
Demonstrate knowledge of:
1. **Classification**
   - Depolarizers - Succinylcholine.
   - Non-depolarizers - d-Tubocurarine, Atracurium, Mivacurium, Rocuronium, Pancuronium, Gallamine, Metocurine, Vecuronium

2. **Mechanism of Action**
   - Physiology of neuromuscular junction.
   - Primary principle.

3. **Distribution and Termination of Action**

4. **"Margin of Safety" Concept**

5. **Factors which may promote difficulty in reversal of relaxant effect.**
   - Non-depolarizers.

6. **Prolongation of Effect of Succinylcholine**
   - Pseudocholinesterase Deficiency (Congenital and acquired).
   - Genetics of congenital, PCE deficiency.

7. **Monitoring of NMB**
   - Peripheral nerve stimulator.
   - Significance of train-of-four / tetanus / post tetanic facilitation / double burst suppression.
   - Clinical criteria for extubation.

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### v. Cholinesterase Inhibition

Demonstrate knowledge of:
1. Edrophonium, Neostigmine, Pyridostigmine, 4 - aminopyrine
2. Mechanism of Action
3. Dosages
4. Pharmacologic Differences and Clinical Significance
5. Side Effects

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### vi. Anticholinergics

1. Atropine, Glycopyrrolate - intended and other systemic effects
2. Dosages
3. Pharmacologic Differences and Clinical Significance
4. Appropriate Combinations with Cholinesterase Inhibitors
5. Central Anticholinergic Syndrome

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### vii. Calcium Entry Blockers

Demonstrate knowledge of:
1. Verapamil, Nifedipine, Diltiazem
2. Mechanism of Action
3. Relative Hemodynamic Effects
   - Chronotropic
   - Inotropic
   - Dromotropic
   - Vasodilation
4. Interaction with Anaesthetic Agents

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### viii. Antihypertensives

Demonstrate knowledge of the following characteristics:
1. Mechanism of Action
2. Interaction with Anaesthetics
3. Specific Problems Associated with Each Group
   - Abrupt withdrawal of B-blockers.

For the following classes of drugs:
  a. Diuretics
  b. Adrenergic neurone blocking agents.
     - Reserpine, Guanethidine
  c. Centrally mediated adrenergic inhibitors.
     - Methyldopa, Clonidine
  d. Monoamine - oxidase inhibitors.
     - Pargyline / tranylcypromine
  e. Beta-adrenergic blocking agents.
     - Propranolol, Metoprolol, Esmolol, Sotalol
     - Concept of those with ISA (intrinsic sympathomimetic activity) and / or cardioselectivity.
  f. ACE inhibition
  g. Direct Vasodilators for Intraoperative Hypotension
     - Hydralazine, Nitroglycerin, Nitroprusside, Trimethophan
     - Indications
     - Dosages
     - Toxicity

**ix. Other drugs**

Demonstrate knowledge of:
- NSAID’s, bronchodilators, aspiration prophylaxis drugs, antinauseants, inotropes and other vasoactive drugs
  - Mechanism of Action
  - Dosages
  - Pharmacologic Differences and Clinical Significance
  - Side Effects

**x. Toxicology**

Demonstrate knowledge of the anaesthetic implications of acute intoxication and chronic abuse of:
- Narcotics, EtOH, Cocaine, Amphetamines, Other

**4. ANATOMY:**

The resident will know the anatomy relevant to the performance of the clinical examination, procedures and possible complications arising in the following systems:

**Objectives:** The resident will be able to describe in detail the anatomic structures outlined below, locate the surface landmarks which guide procedures in these areas, and the presence of significant structures which contribute to complications of the procedure.

**i. Nervous System**

1. Spinal column
2. Spinal cord and meninges
3. Blood supply to the spinal cord
4. Formation of spinal nerves
5. Dermatomal distribution of spinal nerves
6. Autonomic nerves
   • Parasympathetic nerves to viscera
   • Sympathetic nerves, their origin and distribution
     - Stellate ganglion
     - Coeliac ganglion
     - Lumbar ganglion
7. Cranial nerves
   • Trigeminal
   • Vagus
   • Spinal accessory
8. Peripheral nerves
   • Cervical plexus (superficial and deep)
   • Brachial plexus and its main branches
   • Intercostal nerves
   • Lumbar plexus and its main branches
   • Sacral plexus and its main branches

ii. Cardiovascular System

1. Surface anatomy of the heart and great vessels in health and disease.
2. Radiological anatomy of the heart, pericardium and great vessels in health and disease.
4. Nerve supply of the heart.
5. Relationship of vascular structures in the neck and thoracic inlet.
6. Venous anatomy in the upper limb with special attention to the relationship in the ante-cubital fossa.
7. Arterial anatomy of the wrist, hand and foot.

iii. Respiratory System

1. Surface anatomy of the lung and its divisions.
2. Radiological anatomy of the lung and its division.
3. Gross anatomy of the lung and tracheobronchial tree and its correlation with the surface and radiological anatomy.
4. Laryngeal anatomy in general with specific reference to the nerve supply and function of the larynx.
5. Oro- and nasopharyngeal anatomy with the aim of intubation.
6. Endoscopic anatomy of the airway from the external nares or lips to the segmental bronchi.
7. The intercostal bundle and innervation of the thorax.

5. PHYSIOLOGY & PATHOPHYSIOLOGY:

i. Cardiovascular Physiology

The resident will be thoroughly familiar with the anatomy, physiology and common pathophysiology of the cardiovascular system, how it can be manipulated pharmacologically, and how to monitor and intervene in these manipulations.

Objectives: The resident will know and be able to discuss the following topics:

1. Normal Anatomy of the Cardiovascular System (CVS).
   • Heart
     ▪ chambers and valves
     ▪ coronary arteries and veins
     ▪ pericardium
     ▪ surface anatomy and radiological appearance of the heart
2. Embryological Development of the CVS.
   a. Normal
      - primitive heart tube and the sinus venosus
      - the cardiac loop
      - the aortic arches
      - septation
   b. Abnormal - congenital defects. Common abnormalities including:
      - atrial septal defects
      - ventricular defects
      - PDA
      - tetralogy
      - dextrocardia
      - coarctation
      - transposition of great vessels
      - IHSS
      - tricuspid atresia
      - Eisenmenger's syndrome

3. Normal Physiology of CVS.
   a. Electrophysiology
      - pacemaker depolarization
      - electrical transmission
         - atrial
         - A-V nodal
         - ventricular
      - cardiac action potential
      - normal EKG
   b. Physiology of cardiovascular performance
      - myocardial microstructure and metabolism
      - cardiac output
         - control of heart rate
         - control of stroke volume
            - preload
            - afterload
            - contractility
            - left ventricular wall motion abnormalities
         - cardiac output measurements
      - ventricular function - right and left
         - ventricular function curves
            - systolic and diastolic
         - measurement of myocardial contractility
            - invasive techniques
               ◊ force velocity curve
               ◊ Walton-Brodie strain gauge arch
               ◊ rate of pressure development (dp/dt)
               ◊ catheter tip flow probes
               ◊ angiography
               ◊ ultrasound devices to measure muscle wall thickness
            - noninvasive techniques
               ◊ systolic time intervals
               ◊ ballistocardiogram
               ◊ pneumocardiogram
               ◊ impedance cardiogram
               ◊ electrocardiogram
◊ echocardiography
◊ nuclear techniques

- the cardiac cycle
  - ventricular systole
    - isovolumetric contraction phase
    - ventricular ejection phase
    - protodiastolic phase
    - isovolumetric relaxation phase
- physiology of coronary circulation
  - normal coronary blood flow
    - aortic blood pressure
    - in heart rate
    - local metabolic factors
    - left ventricular end-diastolic pressure alterations
    - neural and neurohumoral factors
  - myocardial oxygen balance
- pulses
  - arterial wave form
  - arterial pulse contour
  - venous pulse

c. Physiology of peripheral circulation
- haemodynamics and principles of fluid flow
- microcirculation, lymphatics, blood volume
- control of the peripheral circulation
  - extrinsic
  - intrinsic
  - autoregulation
  - vasomotor centre

d. Normal regulation of blood pressure (physiological)

4. Pathophysiology of the Cardiovascular System.
   a. Congenital defects
   b. Acquired disorders
      - valvular heart disease
      - ischemic heart
      - dysrhythmias
      - cardiomyopathies
      - hypertension
      - shock
      - electrolyte disturbances
      - autonomic disturbances
      - pericardial disease
      - CHF – left and right ventricular dysfunction

5. Pharmacology of the Cardiovascular System.
   a. Effects of anaesthetics on the CVS system
      - the normal heart and peripheral circulation
      - the abnormal heart and peripheral circulation (see 4a and 4b)
      - the cerebral circulation
      - the coronary circulation
      - interactions with drugs used in therapy of the cardiovascular circulation
   b. Anti-arrhythmics
   c. Anti-hypertensives
   d. Sympathomimetic agents
   e. Therapy of shock
6. Cardiopulmonary Bypass  
   a. Physiology of bypass  
   b. Pharmacology of bypass  
   c. Preparations for beginning cardiopulmonary bypass  
   d. Management of cardiopulmonary bypass  
   e. Principles of postoperative care  

7. Monitoring of the cardiovascular system - the principles behind the techniques used; the advantages and disadvantages of each.  
   a. Noninvasive  
      - blood pressure cuff  
         - effects of size  
         - differences in readings using auscultation, oscillotonometry, palpation, pulse monitor  
      - mechanical blood pressure cuff  
      - pulse monitor  
      - electrocardiography  
         - usual and augmented leads  
      - echocardiography  
      - the concept of systolic time intervals, pre-injection period, left ventricular ejection time and their measurement  
      - ejection fraction time, and their measurement  
      - principles of radionucleotide imaging techniques.  
   b. Invasive monitoring of cardiac function.  
      - Filling pressures of right and left heart  
         - techniques available for estimation of left ventricular end-diastolic pressures  
         - use of C.V.P. monitoring  
         - use and interpretation of Swan-Ganz catheter data and situations where use of this data is invalid or questionable.  
      - Cardiac output measurements.  
         - the principles behind the techniques used  
         - the commonest clinical methods in current use  
         - when is it desirable to measure cardiac output?  

8. Physiology of CPR

ii. Pulmonary Physiology

Respiratory System  

Given a patient who presents for an anaesthetic the resident should have a clear understanding of that patient's normal respiratory physiology and how the conduct of the anaesthetic will alter that physiology.

Objectives:  
   a. Discuss the gas laws and why they are important in anaesthesia.  
      - Boyle's  
      - Charles  
      - Van der Waals  
      - Henry's  
      - Graham's  
      - Dalton's  
   b. Discuss the normal dimensions of lung volumes and capacities and how these may be measured. Knowledge of flow volume, relationships is important.  
   c. Discuss the functional anatomy of the lung.  
      - air passages from upper airway to alveolus  
      - pulmonary vascular system  
      - basic histology of the lung
d. Discuss the nonrespiratory functions of the lung to include:
   - innervation of the airway
   - differences in the paediatric patient

e. Discuss in detail the control of breathing as it pertains to:
   - origin of respiratory rhythm
   - motor pathways in breathing
   - chemical control of breathing
     - peripheral chemoreceptors
       - anatomy and innervation
       - effects of CO₂, O₂, H⁺
     - central chemoreceptors
       - location
       - effects of CO₂, O₂, H⁺
       - CSF buffering
   - reflex control of breathing
     - baroreceptors
     - pulmonary stretch receptors
     - j and irritant receptors
     - Herring - Breur, Head reflexes
     - cough reflex
   - drug effects
   - altitude effects

f. Discuss the role of the lung in acid-base regulation

g. Describe the importance of elastic resistance to ventilation as it pertains to:
   - FRC - factors determining FRC and altering FRC
   - elastic recoil of the lungs
     - surfactant
     - LaPlace's law
     - hysteresis
     - time dependence of pulmonary expansion
       - factors affecting lung compliance
       - static and dynamic compliance
   - elastic recoil of the thoracic cage
   - closing capacity

h. Resistance to gas flow
   - laminar flow
     - character
     - factors determining resistance to gas flow
   - turbulent flow
     - Reynolds number
     - relationship of pressure gradient to flow rate, density and viscosity
     - causes of increased airway resistance
     - regulation and modulation of bronchomotor tone

i. Discuss pulmonary ventilation
   - determinants of minute volume and alveolar ventilation
   - causes of inadequate ventilation
   - work of breathing

j. Define respiratory dead space and describe the distribution of inspired gases. This should include a knowledge of
   anatomic, physiologic, alveolar and apparatus dead space, a and the concept of rebreathing.
   - pulmonary blood volume, and West's zones of blood flow
Discuss the importance of matching pulmonary ventilation with perfusion.
- define V/Q mismatch and list factors determining the mismatch
- define venous admixture
- discuss the concept of pulmonary shunting, to include the knowledge of the shunt equation

k. Describe diffusion of gases within the lung.
- factors influencing diffusion
- diffusion abnormalities
- methods of measuring diffusing capacity

l. Discuss Carbon Dioxide with respect to:
- carriage in blood.
- CO₂ stores
- apneic mass movement oxygenation
- adverse effects of hyper/hypo capnea
- methods of measurement of PaCO₂
- CO₂ absorption in anaesthesia circuits

m. Blood gas interpretation to include:
- acute respiratory and metabolic disorders
- chronic respiratory and metabolic disorders
- mixed disorders
- determination of A-a gradient for O₂
- prediction of anticipated increase in PaO₂ with various means of supplying supplement oxygen

n. Discuss the role of pulmonary function testing to include:
- methods of determining lung volume abnormalities
- methods of determining flow abnormalities
- methods of determining diffusion abnormalities
- methods of determining unilateral pulmonary function
- recognition of abnormal values for the above

o. Discuss the indications for and the mechanism of action of the following forms of inhalational therapy:
- Oxygen
- Helium
- Inhaled bronchodilators
- Nitric oxide

p. Mechanical ventilation to include:
- Indication for, the physiologic effects of, and the mechanics of the various modes of ventilation using mechanical ventilators
- PEEP, CPAP
- AutoPEEP

### iii. Haematology

#### Blood Components

1. Discuss the basic physiology of the Red Blood Cell under normal physiological conditions.
   a. the factors that effect the O₂ dissociation curve.
   b. Describe the function of the Red Blood Cell with particular reference to its O₂ – carrying capacity.
   c. List Describe red cell production:
      - Area of the body that produces the Red Blood Cell.
      - An outline of the development of the mature Red Blood Cell from the stem cell.
      - Regulation of the red blood cell production, i.e., tissue oxygenation, erythropoietin.
      - Vitamins and minerals needed for red cell production.
   d. Discuss the basic steps in the synthesis of normal haemoglobin:
• Heme complexes, globin, iron.
• Relate the importance of iron metabolism.
• Relate the importance of its structure to O2 carrying capacity.
e. Outline the normal destruction of red blood cells, and the subsequent catabolism of haemoglobin.

2. The resident should be able to describe the various types of anaemia seen in clinical practice.
a. Define anaemia.
b. Give an etiological classification of anaemia.
c. Discuss the various types of anaemia including:
   • Anaemia due to acute or chronic blood loss.
   • Anaemia due to deficiencies in factors concerned with erythropoiesis such as iron, Vitamin B12, folio acid.
   • Anaemia due to bone marrow failure.
   • Haemolytic anemias.
   • Anaemia due to defective haemoglobin synthesis.
d. Outline the physiological changes that occur in the body secondary to anaemia.
e. Differentiate methemoglobinemia, carboxyhemoglobinemia and sulphemoglobinemia.

3. The resident should be able to demonstrate the knowledge and understanding of polycythemia.
a. Define polycythemia.
b. Discuss secondary polycythemia.
c. Discuss polycythemia rubra vera.
d. Describe the effect of polycythemia on the circulatory system.

4. The resident should demonstrate knowledge and understanding of the role of leukocytes, the tissue macrophage system, and the inflammatory response in man.
a. List the special systems for combating different infectious and toxic agents in the body.
b. Describe the general characteristics of leukocytes.
c. Outline the genesis and life span of leukocytes.
d. Discuss the tissue macrophage system (the reticuloendothelial system).
e. Describe the process of inflammation.
f. Discuss the spleen as to its structure and function.

5. The resident should demonstrate knowledge of platelets and platelet function.
a. Outline the life cycle of the platelet.
b. Describe the function of platelets.
c. Discuss thrombocytopenia.
d. Describe other platelet disorders.

**Hemostasis**

1. The resident should have a good understanding of normal hemostatic mechanisms, with particular emphasis on the sequence of events required to achieve hemostasis after vessel injury.
a. Define hemostasis.
b. List factors preventing haemorrhage.
c. List factors controlling haemorrhage and describe their interaction.

2. In addition to a basic knowledge of the coagulation cascade, the resident should have an appreciation of how it interacts with other hemostatic mechanisms.
a. Diagram the coagulation cascade.
b. Describe the roles of calcium and platelet phospholipid.
c. Describe activation of:
   • the extrinsic system
   • the intrinsic system
d. Discuss the relative importance of the two systems in the prevention and control of bleeding.
e. Describe the role of thrombin.
f. Discuss the importance of factor XII to the Kallikrein system and plasmin generation, and their effects on the coagulation cascade.
g. Discuss the function of fibrinolysis, and pharmacology of agents that inhibit fibrinolysis.
h. Describe how clotting factors are protected from plasmin.
i. Know from where plasminogen activators come.
j. Summarize the normal stimulation of fibrinolysis, and diagram the steps in the process.
k. Know the rationale and dangers of fibrinolytic therapy (streptokinase, tissue plasminogen activator).

Coagulopathy

1. The resident should have an organized approach to disorders causing excessive bleeding and detailed knowledge of the pathophysiology of the common ones.
   a. Categorize the causes of abnormal bleeding.
   b. Describe the bleeding pattern of vascular disorders.
   c. Know the most common inherited hemorrhagic disorder of a vascular nature, and describe it.
   d. List causes of acquired vascular defects.
   e. Divide bleeding disorders caused by platelets into two functional groups.
   f. Describe the life cycle of the platelet.
   g. Describe normal platelet function in response to vessel trauma.
   h. List categories of thrombocytopenia and give the common causes of each.
   i. Know why chronic immune thrombocytopenia is affected by:
      - immuno-suppressive drugs, i.e., cyclophosphamide
      - splenectomy
      - corticosteroids
   j. Describe the pathogenesis of drug-induced immune thrombocytopenia.
   k. Divide the disorders of platelet function into groups according to defect.
   l. List the mechanisms of production of coagulation factor defects.
   m. Know where clotting factors are made.
   n. Know which are the common inherited clotting factor abnormalities, the defect in each, and how they are transmitted.
   o. Describe the function of circulating antibodies to the coagulation factors.
   p. List the common acquired coagulation disorders.
   q. Know the approximate half-lives of the clotting factors, and how long they remain in banked blood.
   r. Discuss the massive transfusion syndrome.
   s. Discuss the role of vitamin K on coagulation factor synthesis.
   t. Discuss pathological fibrinolysis including:
      - the role of tissue activator
      - factors contributing to the defect

Thrombin and Emboli; Anticoagulants

1. The resident should have a clear idea of the causes, treatment and prevention of thrombus formation.
   a. Discuss the differences between arterial, venous, capillary and cardiac thrombi including:
      - structure
      - location
      - cause
      - route and importance of embolization
   b. List the mechanisms that prevent thrombus formation.
   c. Discuss the differences between a hemostatic plug and a thrombus.
   d. Discuss:
      - the anticoagulant drugs heparin, and the vitamin K antagonists
      - the antiplatelet drugs aspirin, dipyridamole and sulpha pyrazine
      - the fibrinolytic drugs streptokinase and urokinase
With respect to:
  - site of action
  - time course of action
  - route and method of action
  - method of monitoring effect
  - antidote
  - indications
  - contraindications
e. Outline other embolic syndromes: fat emboli, septic embolic, paradoxical emboli, air emboli, catheter emboli.

**Blood Coagulation Tests**

1. The resident should be knowledgeable about the laboratory available to monitor haematologic function.
   a. Discuss each of the common tests of bleeding disorders including:
      - the logic behind the test
      - what it does and does not measure
      - how it is performed
      - the sensitivity and specificity of the test
   This should include:
      - tourniquet test
      - bleeding time
      - blood film
      - platelet count
      - thrombin time
      - prothrombin time & INR
      - partial thromboplastin time + ACT
   b. Know what other investigations are available for use in particular problems. This should include:
      - factor assays
      - drug assays
      - platelet function tests
      - measurement of fibrin split products
      - other

**Disseminate Intravascular Coagulation**

1. A complete knowledge of DIC is mandatory.
   a. Define DIC.
   b. Describe its effects on:
      - clotting factors
      - platelets
      - fibrinogen
c. List the possible initiating mechanisms.
   d. Describe the effects on the fibrinolytic systems.
   e. Know the complications of DIC from:
      - haemorrhage
      - thrombosis
   f. List the laboratory investigations used to detect DIC, and the expected results of them.
   g. Discuss the role of heparin in DIC.

**Blood Groups, Transfusion and Transplantation**
1. The resident will know the major blood typing system and how blood is prepared for transfusion.
   a. Draw up a table of the ABO blood group system indicating the antigens and isohemagglutinins found in each of the groups A, B, O and AB. List other blood group systems.
   b. Describe the phenomenon of Rh sus incompatibility and how the consequences can be avoided.
   c. Define "Universal Donor."
   d. Describe the antiglobulin test and outline the components of a complete cross matching.
2. The resident will know which blood groups may be transfused and the possible complications of transfusion.
   - With the ABO-Rh systems list the blood groups a recipient may be transfused. Include whole blood, platelets and fresh frozen plasma.
   - List the immunologically mediated complications of blood transfusion.
   - List the non-immunologically mediated complications of blood transfusions.
   - Outline the consequences of leucocyte incompatibility in transfusion.
   - Outline the diagnosis and treatment of a transfusion reaction.
3. The resident will know the main immunological factors concerned with transplantation of tissues and organs.
   a. Define the terms Xenogenic (heterogenic); Allogenic (homologous) and Autologous.
   b. Briefly outline the strong (I-HA) + (ABH) and weak this to compatibility systems found in man and used for immune typing.
   c. Define 'first set' and 'second set' graft rejection.
   d. Outline the role of lymphocytes and humoral antibody in graft rejection.
   e. Outline the pharmacological approach to immune suppression and its complications.
4. The resident will know the blood products, artificial blood and volume expanders that are available along with their characteristics.
   a. List the components that a unit of whole blood can yield.
   b. Discuss how red blood cells are stored and the problems associated with storage.
   c. Discuss the storage problems associated with granulocytes, platelets and the coagulation factors.
   d. List the types of artificial blood that have been formulated giving their advantages and disadvantages over red blood cells.
   e. List the artificial volume expanders that are available and their characteristics.
   f. List the infective agents that may be transmitted via blood product transfusion.

iv. Immunity and Allergy

1. The resident will be knowledgeable of the innate, non-specific immune mechanisms that are effective against infective agents, play a role in transplantation medicine, and subserve ARDS, MSOF and SIRS.
   b. List the determinants of Innate Immunity and its mechanisms of action.
   c. Define phagocytosis. Give examples of intracellular killing mechanisms.
   d. Define opsonin.
   e. Outline complement activation by the classical and alternate pathways and give examples of the biological activities of complement activation products.
   f. Describe the three main features of an inflammatory response and give examples of endogenous mediators of inflammation.
2. The resident will know the mechanisms of acquired immunity.
   a. Describe the two forms of adaptive immunity-humoral and cell mediated.
   b. Differentiate active and passive immunity.
   c. Discuss briefly the development of cells of the immune system and their function. briefly the role of the thymus in the immune response.
   d. Differentiate primary from secondary immune response.
   e. Define immune tolerance.
   f. List the lymphocyte activation products (lymphokines) and describe their role in immunity.
   g. Outline the investigations used in evaluating the immune response.
   h. Distinguish the role of T and B-lymphocytes in the immune reaction.
3. The resident will know the basic characteristics of antigens and antibodies.
   - Define immunogen and hapten.
   - Outline the determinants of antigen specificity; list the molecular requirements of immunogenicity.
   - List in the form of a table the five classes of immunoglobulins and their characteristic properties.
   - Draw a schematic diagram of the structure of the IgG molecule and describe the function of the individual domains.

4. The resident will know the five types of immune responses causing tissue injury.
   - Distinguish between delayed and immediate type hypersensitivity reactions.
   - Describe anaphylactic (type 1) reactions and the pharmacological mediators involved. Distinguish between on anaphylactoid reaction.
   - Describe cytotoxic (type 2) reactions and antibody-dependent cell mediated cytotoxicity.
   - Describe toxic complex (type 3) reactions and provide an example.
   - Outline the lymphocyte mediated delayed (type 4) reaction and list two common inducing agents.
   - Describe stimulatory (type 5) reactions and list two examples.
   - Differentiate two categories of immuno-deficiency state.

v. Neurophysiology

1. To understand the basic anatomy and physiology of a neuron.
   Be familiar with:
   a. The structure of a spinal motor and peripheral sensory neuron.
   b. Axoplasmic transport
   c. Excitation and impulse propagation, resting membrane and action potential, saltatory conduction.
   d. The different types of nerve fibre: A, B, C and subgroups.
   e. The effects of local anaesthetics on nerve fibres.

2. To understand the structure and function of skeletal muscle and smooth muscle.
   Be familiar with:
   a. The organization of muscle fibres, striations, sarcotubular system and different muscle types.
   b. The electrical characteristics and contractile mechanism.
   c. The energy sources and utilization, oxygen debt and heat production.
   d. The effects of denervation, EMG responses.
   e. Neuronal and muscle diseases pertinent to anaesthesia:
      - motor neuron disease
      - demyelinating disease
      - muscular dystrophies
      - familial periodic paralysis
      - glycogen storage diseases
      - tetanus
      - malignant hyperthermia syndrome
      - myasthenia gravis and myasthenic syndrome

3. To understand synaptic transmission.
   a. Synaptic, presynaptic and postsynaptic junctions, different types of receptors.
   b. Electrical events: excitatory postsynaptic potential (CEPSP), inhibitory postsynaptic potential (IPSP), synaptic delay.
   c. Chemical transmitters: acetylcholine, norepinephrine, dopamine, epinephrine, SHT, glycine, gamma-amino-butyric acid, etc.
   d. Drugs affecting the chemical transmitters including anaesthetic agents.
   e. Facilitation and inhibition, post-tetanic potentiation.

4. To understand neuromuscular transmission.
   a. To anatomy of the myoneural junction: terminal axon, motor end plate, acetylcholine receptor.
   b. Normal sequence of events during transmission of impulses, end-plate potential, action potential, quantal releases.
   c. Denervation effects and hypersensitivity.
d. Effects of muscle relaxants and reversal agents on neuromuscular transmission.
e. The characteristics of a nerve stimulator and the response to twitch, train-of-four and tetanic stimulation in normal muscle and that under the influence of different muscle relaxants.

5. To understand the reticular activating system, thalamus and cerebral cortex.
   a. The anatomic organization of the R.A.S., thalamus and cortex.
   b. Effect of general anaesthetics on the CNS, theories of anaesthesia.
   c. Electrophysiologic monitoring: electroencephalogram, cerebral function monitor, spectral array analysis, evoked potentials.
   d. The effects of anaesthetic agents on the above electrophysiology.
   e. Types and mechanisms of seizures, antiepileptic drugs.
   f. Sleep and its stages, differences compared to anaesthesia.

6. To understand cerebral circulation and metabolism.
   a. The blood supply to the brain, main vessels, capillary junctions, blood-brain barrier.
   b. Formation and absorption of CSF, effects of anaesthetics and drugs (acetazolamide, steroids).
   c. The measurement of cerebral blood flow: Kety-Schmidt, inert gas, hydrogen, microspheres.
   d. The regulation of cerebral blood flow, effects of anaesthetic agents, critical levels.
   e. Cerebral metabolism: CMRO$_2$, glucose, ketones, effect of drugs, PET scanning (position emission tomography).
   f. Intracranial pressure and its measurement by extradural, subdural or intraventricular devices, causes of raised I.C.P. methods of reducing.
   g. Cerebral perfusion pressure, brain compliance.
   h. The causes of coma.
   i. Pertinent neurologic diseases: stroke, subdural, extradural, trauma, tumours, aneurysm, cerebral insufficiency, "neurogenic pulmonary oedema".

7. To understand the principles of neurodiagnostic methods.
   - Cerebral angiography, digital subtraction venography, CT scan, nuclear magnetic resonance (NMR) scan, positron mission tomography (PET) scan, ultrasound.

8. To understand the basics of posture and movement.
   Be familiar with:
   a. The pyramidal and extrapyramidal systems.
   b. Spinal integration and transection, spinal shock and progression to stable chronic state, mass reflex.
   c. Physiology of decerebration and decortication.
   d. Basal ganglia function, Parkinson's disease, L-dopa.
   e. Basic cerebellar function.

9. To understand the autonomic nervous system.
   Be familiar with:
   a. The anatomic organization, sympathetic and parasympathetic, ganglia and connecting fibres.
   b. Chemical transmitters at synaptic junctions, muscarinic and nicotinic receptors, formation and release, reuptake, metabolism.
   c. Adrenergic discharge, receptor types and function.
   d. The effects of α and β agonist and antagonist drugs.
   e. Diseases of the autonomic nervous system: familial dysautonomia (Riley-Day), Shy-Drager.
   f. Autonomic hyperreflexia.

10. To understand the vomiting mechanism.
    Be familiar with:
    a. The organization of the co-ordinated process of vomiting.
    b. The anatomic location and connections of the vomiting centre and the chemoreceptor trigger zone.
    c. The factors which can induce nausea and vomiting.
    d. The actions of antiemetic drugs.

11. To understand the basic actions and pathology of the hypothalamus, pituitary and limbic system.
    Be familiar with:
vi. Endocrine and Metabolism

Be familiar with the preoperative, intraoperative, and postoperative management of the following conditions:

a. Diabetes Mellitus
b. Hyper and hypofunction of adrenal gland
c. Hyper and hypofunction of Pituitary gland and hypothalamus
d. Hyper and hypofunction of Thyroid and Parathyroid
e. DI, SIADH
f. Calcium, Phosphate, and Magnesium homeostasis
g. Carcinoid syndrome
h. Malignant hyperthermia
i. Surgery, anaesthesia and stress response
j. Thermoregulation

vii. Hepatic Physiology

Be familiar with and able to describe:

a. Hepatic Circulation
b. Liver Function
c. Tests of Liver Function
d. Effects of anaesthesia and surgery on liver function
e. Pathophysiologic states:
f. Hepatitis - acute and chronic
g. End-stage liver disease
   • porphyria
   • hepatotoxins
   • postoperative jaundice
   • portal hypertension

viii. Renal Physiology

Be able to describe the following:

a. Renal Function Tests
b. Effects of anaesthesia and surgery on renal function
c. Acid-base control
d. Fluid and Electrolyte Balance
e. Pathophysiologic States
f. Acute and Chronic Renal Failure
g. Principles of Dialysis
h. Nephrotoxins

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Clinical Science Objectives
of the Postgraduate Program in Anesthesiology

A. Cardiac and Vascular Anaesthesia

Goals and objectives for this rotation are built upon the basic science objectives for pharmacology and the clinical objectives for the Cardiology rotation.

The resident will conduct a patient assessment, formulate an anaesthetic plan of management, institute appropriate monitoring, and provide a safe anaesthetic for patients with severe cardiovascular disease. The resident will provide appropriate ICU care postoperatively, and transfer this care with a concise and accurate summary.

Specific Objectives:
1. The resident will assess the anaesthetic risk of patients with cardiac or vascular disease understanding and using the appropriate investigations. The resident will be able to describe various risk stratification protocols.

2. Preoperatively, the resident will prepare the patient psychologically, pharmacologically and physiologically for cardiac and vascular surgery.

3. The resident will know, understand, and be able to select and apply appropriate monitoring techniques.

4. The resident will be able to:
   - cannulate peripheral arteries
   - gain access to the central venous circulation
   - insert pulmonary artery flotation catheters
   - be familiar with the usage of Transesophageal Echocardiography (TEE)

   The resident will be aware of the complications of these techniques, pitfalls in their interpretation, preventative measures to reduce complications, and the management of these complications.

5. The resident will recognize that these patients are often critically ill, they and their families psychologically stressed, and close cooperation and clear communication amongst medical, surgical, anaesthetic and nursing staff is essential.

6. The resident will conduct a safe anaesthetic induction, maintenance and emergence for patients with severely compromised cardiac function:
   - CAD
   - CHF – Right and Left ventricular dysfunction
   - Hypertension
   - Cardiomyopathies
   - Tamponade
   - Valvular Disease
   - Dysrhythmias
   - Pacer, Defibrillator
   - Prior Cardiac Transplant
   - Congenital Heart Disease

7. The resident will be able to describe the pathophysiology and management of cardiopulmonary bypass and Ventricular Assist Devices.

8. The resident will have and implement a management plan for common problems causing low cardiac output states post bypass, including use of inotropes and vasoactive agents, intra-aortic balloon pumps.

9. The resident will diagnose and treat all cardiac arrhythmias.
10. The resident will have a differential diagnosis, investigation, prevention and management plan for excessive bleeding post bypass surgery. The resident will be conversant with the benefits of antifibrinolytic therapy.

11. The resident will understand the hemodynamic profiles consistent with optimal cardiac function in valvular heart disease.

12. The resident will be able to describe the anaesthetic management of thoracic aortic surgery.

13. The resident will be able to safely anaesthetize patient for the following operations:
   - carotid endarterectomy
   - abdominal aortic surgery
   - peripheral vascular surgery.
   - implanted cardiac defibrillator.
   - ASD and VSD repair
   - restrictive pericardial disease
   - cardiac tumors (myxomas)
   - cardioversions
   - Minimally Invasive CABG
   - CABG requiring CPB

14. The resident will be able to plan for appropriate postoperative pain management for these patients.

**B. Thoracic Anaesthesia:**

**Goal:**
The resident will be able to provide a complete preoperative evaluation and implement an appropriate anaesthetic plan of management for patients presenting with thoracic disease requiring surgery.

**Objectives:**

**The Perioperative Period**
1. The resident will be able to do a complete history and physical examination to assess the extent of pulmonary disease. The resident will be able to stratify the risk assessment of the patient.

2. The resident will be able to select appropriate pulmonary function tests and will be able to discuss the use of whole-lung and split-lung function tests to predict postoperative risk.

3. The resident will be able to recognize the effects of pulmonary disease on right ventricular function and will be able to describe the physical signs and laboratory investigation of patients who have right ventricular dysfunction.

4. The resident will recognize that patients who present for surgery may not be in optimal physical condition. The resident will be able to define specific measures to optimize the patient’s condition.

5. The resident will be able to describe preoperative preparation for patients with chronic obstructive pulmonary disease.

6. The resident will be able to describe the specific considerations for assessing patients with
   - pulmonary malignancies
   - asthma
   - COPD
   - Cystic fibrosis
   - Pulmonary fibrosis
   - Pulmonary hypertension

**The Intraoperative Period**

*Monitoring requirements.*
1. The resident will be able to describe the mode of operation of the commonly used monitors for thoracic surgery.

2. The resident will be able to select these monitors appropriately depending upon the patient's planned surgery and medical condition.

**Choice of anaesthesia.**

1. The resident will be able to select anaesthetic agents appropriate for the perioperative management of the specific patient. In particular, the resident will know the anaesthetic considerations for the following conditions:
   - Bronchoscopy
   - Mediastinoscopy
   - Lobectomy
   - Pneumonectomy
   - Tracheal resection
   - Thorascopic surgery
   - Airway laser surgery
   - Esophageal surgery

2. The resident will be able to describe in detail the physiology of the lateral decubitus position specifically its effects on distribution of ventilation and perfusion.

3. The resident will be able to describe the physiology of the open chest including mediastinal shift and paradoxical respiration.

4. The resident will be able to describe the physiological changes that occur during the onset of one-lung anaesthesia.

5. The resident will be able to describe the various clinically used techniques of producing differential lung ventilation.

6. The resident will be able to describe three absolute and three relative indications for one-lung anaesthesia.

7. The resident will be able to describe a systematic technique to ensure proper functioning of left-sided double lumen endotracheal tube.

8. The resident will be able to list the common complications of the use of double lumen endotracheal tubes.

9. The resident will be able to describe the ventilatory management of one-lung anaesthesia.

10. The resident will be able to formulate and enact a plan of management for hypoxemia that occurs during one-lung ventilation.

11. The resident will be able to manage the following specific problems:
   - Mediastinal mass
   - Bronchopleural fistula
   - Pulmonary Hemorrhage
   - Bullae
   - Pneumothorax

12. The resident will be able to describe the physiological considerations relevant to Thorascopic surgery.

**Postoperative Period**

1. The resident will be able to diagnose and treat
   - massive hemorrhage
   - blowout of bronchial stump
   - herniation of the heart through the pericardium
   - acute right-sided heart failure following pulmonary resection.

2. The resident will be able to discuss and use current techniques for administering postoperative analgesia.
3. The resident will be able to provide a safe anaesthetic plan for following specific procedures:
   - mediastinoscopy
   - thoracoscopy
   - massive pulmonary hemorrhage
   - superior vena caval syndrome
   - giant bullous emphysema
   - bronchopleural fistula
   - tracheal resection
   - unilateral bronchopulmonary lavage

C. Neuroanaesthesia

The basic sciences for this rotation are found in the pharmacology, pediatric and neuroanaesthesia portions of Section III.

Goal:
The resident will provide a safe anaesthetic for all common neurosurgical problems. The resident will discuss the neurophysiologic changes induced by anaesthetic agents. The resident will be familiar with all currently used monitoring techniques.

Objectives:
1. For general neuroanaesthesia considerations, the resident will:
   - state the determinants and normal values for cerebral blood flow.
   - describe the measurement of cerebral blood flow
   - discuss the determinants of cerebral metabolic rate
   - outline the secretion and circulation of cerebral spinal fluid.
   - know the determinants of intracranial pressure.
   - state the factors affecting intracranial compliance.
2. The resident will be able to order the appropriate ancillary investigations and therapy to optimize the patient preoperatively.
3. The resident will be familiar with the effects of inhalational anaesthetic agents on cerebral blood flow and metabolism.
4. The resident will state the effects of intravenously given drugs on cerebral blood flow and metabolism, specifically:
   - the barbiturates
   - propofol
   - benzodiazepines
   - opioids
   - neuroleptics
   - ketamine
   - mannitol
   - neuromuscular blocking agents
   - vasodilators
5. The resident will be familiar with the basic techniques and, where applicable, the normal wave patterns for the following:
   - EEG
   - Evoked Potentials
   - ICP
   - Transcranial Doppler
6. The resident will be able to describe the effect of anaesthetic agents on the above monitoring modalities.
7. The resident will state strategies to afford cerebral protection in situations of raised intracranial pressure and global or focal cerebral ischemia.
8. The resident will state the definition of the "inverse steal" phenomenon.

9. The resident will outline the assessment of patients for evidence of raised intracranial pressure, the acute interventions to stabilize these patients, and the principles of intensive care management of these patients postoperatively.

10. The resident will identify the neuroendocrine problems associated with neurosurgical patients, their investigation and therapy.

11. The resident will state the significance of positioning in neurosurgical patients including monitoring for and treating venous air embolism.

12. The resident will state and implement an anaesthetic plan of management for each of the following circumstances from preoperative assessment, preparation, induction, monitoring, maintenance, emergence and postoperative care in PARR or the neurosurgical ICU:
   - intracranial aneurysms
   - Ischemic cerebrovascular disease
   - mass lesions especially the posterior fossa
   - transphenoidal hypophysectomy
   - acute head injury
   - acute spinal cord injury
   - the patient requiring neuroradiologic procedures
   - the patient with cervical spine disease or injury
   - the patient for awake craniotomy (epilepsy or stereotactic surgery)

13. The resident will be aware of the associated complications of neurosurgical patients, in particular:
   - Coagulopathy
   - cranial nerve dysfunction postoperatively
   - neurogenic pulmonary edema
   - the need for deliberate hypotension.
   - SIADH
   - Air embolism
   - Intracranial Hypertension

14. The resident will know the clinical criteria for declaring brain death in a patient.

**D. Obstetrical Anaesthesia**

**Goals:**
At end of the obstetrical anaesthesia rotation the resident will assess a healthy pregnant mother and be able to develop a plan of management for anaesthesia and analgesia during labour. The resident will assess factors that may alter neonatal risk. The resident will also assess mothers who may have systemic illness. The resident will be able to alter the plan of management to compensate for these illnesses.

**Objectives**

**Mother and Fetus**

1. The resident will know the common maternal physiologic alterations during pregnancy. These will include the primary physiologic events including altered hormonal activity, metabolic activity, uterine size, and vascularity.
2. The resident will be familiar with the organ system changes especially those for cardiovascular, hematological, respiratory, gastrointestinal, renal, skin and mucous membrane, central nervous and musculoskeletal systems.
3. The resident will know the cardiovascular and respiratory changes that occur in the intrapartum period.
4. The resident will be familiar with the postpartum changes in the cardiovascular, haematologic, respiratory and gastrointestinal systems.
5. The resident will describe the effects of these altered physiologic systems on the administration of anaesthesia.
6. The resident will be able to describe the indications for fetal HR monitoring. The resident will recognize abnormal patterns, their possible causes and the need for intervention.
7. The resident will be able to list the clinically use methods of evaluating fetal well-being. They will know the clinical implications of a positive NST, OCT, and biophysical profile.

Perinatal Pharmacology
1. The resident will describe the anatomy of the normal maternal placental fetal unit.
2. The resident will understand the physiology of the circulation in the maternal placental fetal unit.
3. The resident will understand the mechanism of drug transfer across the placenta.
4. Effects of maternally administered drugs on the fetus and newborn.
5. The resident will describe the common methods of evaluation of neurobehavioral status.
6. The resident will discuss the advantages and disadvantages of the common methods of pain relief during labour.
7. The resident will be able to describe the effects of anesthesia/analgesia on uterine blood flow and uterine activity.
8. The resident will be familiar with the chemical structure, mechanism of action, effect on the nerve cell membrane, the pharmacologic basis of action, the systemic toxicity of the local anaesthetic agents.

Epidural and Subarachnoid Narcotics
1. The resident will be familiar with the mechanism of action of epidural and intrathecal narcotics and understand the potential side effects of agents used in this fashion.

Nonpharmacologic pain relief
1. The resident will discuss the current role of prepared childbirth in the normal delivery:
   - hypnosis;
   - acupuncture;
   - transcutaneous electrical nerve stimulation.

Drug interactions
1. The resident will describe the general pharmacology and pharmacologic effects of the following agents: oxytocics, prostaglandins, magnesium sulphate, and tocolytics.

General anaesthesia
1. The resident will understand the current indications in the use of inhalational agents for analgesia during labour.
2. The resident will be familiar with the current techniques of administration of inhalational anaesthetics.

Regional Anaesthesia
1. The resident will be familiar with the pain pathways in parturition.
2. The resident will be familiar with the mechanism of action, technique of administration, indications and contraindication of the use of epidural anaesthesia.
3. Residents will be familiar with the methods of providing continuous lumbar epidural infusions.
4. The resident will understand the advantages, disadvantages and current techniques of providing caudal analgesia during labour. The resident will be familiar with the techniques, advantages and disadvantages of spinal analgesia and anaesthesia for cesarean section and labour. The resident will describe the indications and technique of pudendal nerve block. The resident will also describe the common problems associated with pudendal nerve block.
5. The resident will describe the treatment of unintentional intravascular injections: unintentional subarachnoid injection; and the complication of any of the above techniques.

Cesarean Section
1. The resident will describe and perform spinal, epidural and general anaesthesia for cesarean sections. The resident will fully understand the complications and treatment of complications for any of these techniques.

Agents affecting uterine tone:
Residents will be able to:
1. Describe the effects of potent inhalation anesthetics and ketamine on uterine tone.
2. List drugs used clinically for tocolysis and their systemic side effects.
3. Describe the indications for the use of GTN, indicating the dose, route of administration, maternal and fetal effects.
Specific Conditions
1. The resident will be able to demonstrate the appropriate preoperative assessment and management of:
   - Preterm Labour
   - Prolapsed cord
   - Pre-eclampsia, Eclampsia, HELLP Syndrome
   - Multiple Gestations
   - Abnormal Presentations, Shoulder dystocia
   - Pre and Post-partum Hemorrhage, Uterine Dehiscence, Uterine Inversion, Amniotic Fluid Embolism
   - Operative vaginal delivery
   - Cesarean Section

Other conditions
1. The resident will be familiar with the particular considerations associated with:
   2. Non-obstetrical Surgery in the Pregnant Patient
   3. CPR in the Pregnant Patient
   4. Neonatal Resuscitation

The high risk parturient:
1. The resident will explain which factors should be considered in diagnosing a pregnant woman as high risk.
2. The resident will describe how the risk factors adjust the considerations for analgesia and anaesthesia
3. The resident will describe and perform anaesthetic techniques for patients with prepartum hemorrhage, toxemia, diabetes mellitus, cardiac disorder, neurologic disorders, respiratory disorders, renal disorder, haematologic disorders, endocrine disorder.

Complications of Regional Anaesthesia:
1. The resident will describe how patients having regional analgesia or anaesthesia should be properly monitored.
2. The resident will diagnose and treat the following complications: Hypotension; systemic toxic reaction; headache, late neurologic sequela.

Anaesthesia and surgery during pregnancy:
1. The resident will discuss drug induced fetal effects.
2. The resident will describe methods to avoid intrauterine asphyxia
3. The resident will describe factors that may affect the onset of premature labour.
4. The resident will describe the current recommendations for anaesthesia during pregnancy.

Anaesthesia for the postpartum period:
1. The resident will be familiar with the physiology of the postpartum period.
2. The resident will describe anaesthetic techniques for elective surgery in the postpartum period.
3. The resident will describe the anaesthetic technique used for emergency surgery in the postpartum period.
4. The resident will describe, diagnose and treat the syndrome of DIC.

Resuscitation of the newborn
1. The resident will describe the physiologic changes that occur at birth.
2. The resident will recognize the limited and diverse mechanisms by which the neonate maintains body temperature.
3. The resident will describe the usual delivery room care of the healthy newborn
4. The resident will discuss and anticipate causes neonatal depression.
5. The resident will be familiar with the principles of resuscitation of the newborn.
6. The resident will indicate the importance of the Apgar Score to the technique used for the resuscitation.
7. The resident will describe the equipment and drugs necessary for resuscitation for the newborn.
8. The resident will describe the currently recommended management for meconium aspiration.

Differential diagnosis of the newborn in distress:
1. The resident will discuss the common cause of neonatal distress.
2. The resident will diagnose and treat the following specific conditions:
   - airway obstruction due to choanal atresia
   - respiratory distress syndrome
   - meconium aspiration
• pneumothorax
• diaphragmatic hernia
• tracheoesophageal fistula
• congenital heart disease
• persistent fetal circulation
• hypovolemia
• immature respiratory center
• hypoglycemia
• myasthenia gravis.

Maternal mortality:
1. The resident will understand the cause of maternal mortality
2. The resident will understand the anaesthetic contribution to maternal mortality.

E. Paediatric Anaesthesia

Goals:
Given a pediatric patient presenting for any type of surgery, the resident will outline a plan of management and institute a safe anaesthetic for that patient which will encompass an awareness of the psychological impact of the experience for the child and its family.

Objectives:
13. The resident will outline the difference between adult and pediatric anatomy and physiology in relationship to anaesthesia including the perioperative fluid and electrolyte, and temperature management of surgical paediatric patients.

14. The resident will be able to use a variety of approaches in dealing with children of all ages in their preparation for anaesthesia and surgery.

15. The resident will develop criteria for accepting children for anaesthesia.

16. The resident will learn the principles of using paediatric anaesthesia circuits and equipment and will be able to choose the appropriate equipment for any case.

17. The resident will understand the altered pharmacodynamics in the newborn infant.

18. The resident will describe the anaesthetic implications of common pediatric disorders. These will include:
   • haematologic disorders including anemia, sickle cell states, thalassemia, ITP, hemophilia
   • atypical plasma cholinesterases
   • diabetes mellitus
   • malignant diseases
   • noncardiac surgery in children with congenital heart diseases
   • Down's Syndrome
   • malignant hyperpyrexia
   • cystic fibrosis

19. The resident will understand the anaesthetic implications of pediatric syndromes and unusual disorders to the depth described in Stewart's Manual of Pediatric Anaesthesia.

20. The resident will describe the special considerations of the premature infant coming for surgery and also will understand the longer term problems of providing anaesthetic care to patients who were born prematurely but present for surgery at a later date.

21. The resident will describe the anaesthetic management of patients presenting for common neurosurgical procedures. These will include:
patients with hydrocephalus
- increased intracranial pressure
- intracranial hematomas
- craniosynostosis
- myelomeningocele
- encephalocele
- spinal cord tumors
- intracranial tumors.
- common neuroradiologic techniques.

13. The resident will describe the anaesthetic management and potential complications of patients presenting for common ophthalmologic procedures.

14. The resident will describe the common problems and accepted anaesthetic management of patients presenting for dental surgery.

15. The resident will be familiar with the anaesthetic management for common elective ENT procedures.

16. The resident will discuss, diagnose and treat the more common forms of pediatric lung disease. In the newborn, the resident will discuss the importance of pulmonary surfactant; respiratory distress syndrome of the newborn; and abnormal breathing patterns. In the older child the resident will diagnose and treat croup, bronchiolitis, cystic fibrosis and epiglottitis. The resident will describe in detail the anaesthetic management of upper airway obstruction in a child.

17. The resident will describe the anaesthetic considerations for repair of cleft lip and palate.

18. The resident will describe the anaesthetic management of common congenital defects that may require surgery during the neonatal period. As a minimum the resident will describe the management of:
- congenital lobar emphysema
- congenital diaphragmatic hernia
- tracheoesophageal fistula and esophageal atresia
- congenital hypertrophic pyloric stenosis
- omphalocele and gastroschisis
- biliary atresia.

19. The resident will describe the anaesthetic technique used in management of common closed heart operations including patent ductus arteriosus, resection of aortic coarctation, palliative surgery to increase pulmonary blood flow, palliative surgery to increase intra-atrial mixing, palliative surgery to decrease pulmonary blood flow. The resident will describe an acceptable technique of preoperative assessment of patients with congenital heart disease. The resident will describe a plan of management for patient presenting for noncardiac surgery who has congenital heart disease.

20. The resident will be familiar with the perioperative management of children with common paediatric cardiovascular anomalies including: Tetralogy of Fallot, patent ductus arteriosus, aortic coarctation, atrial septal defects and ventricular septal defects.

21. The resident will develop a plan to deal with children who have renal insufficiency or failure.

22. The resident will describe the anaesthetic implications of surgery for kyphoscoliosis.

23. The resident will describe the anaesthetic implications of acute burns.

24. During anaesthesia rotations at CHEO and during the residency in Kingston, the resident will be expected to provide anaesthesia in the following cases:
- circumcision
- common hernia repair
- pyloric stenosis
• neonatal surgery (including TE fistula)
• reimplantation of ureters
• ex-premature child
• cystoscopy
• orchidopexy
• cranioplasty
• posterior fossa surgery
• cleft lip and palate repair
• burns
• foreign body in the airway
• controlled hypotension
• difficult airway
• patent ductus arteriosus
• non-open heart cyanotic congenital heart disease
• bronchoscopy
• tonsillectomy
• myringotomy and tubes
• Harrington rod insertion
• rapid sequence of induction
• child with a recent URTI
• malignant hyperpyrexia muscle biopsy

29. The resident will know the rational for the development of the fasting guidelines for his/her hospital.

30. The resident will be familiar with the practical aspects of providing anaesthesia for children outside of the OR including anaesthesia for MRI, CT scan, other investigative procedures

F. General Surgery, Endoscopic Surgery, Laser Surgery

Objectives:
1. Residents will be able to perform thorough preoperative evaluations of the patient considering the necessary preparation and premedications for the patient. The patient concomitant disease will be taken into consideration.

2. The resident will be able to outline the necessary considerations and demonstrate competency in delivering anaesthetics for patients needing:
   • Cholecystectomy
   • Appendectomy
   • Bowel Obstruction and Perforation
   • Bowel Resection
   • Acute Gastrointestinal Bleeding
   • Splenectomy
   • Pancreatic Resection
   • Hepatic Resection
   • Portal Shunting Procedures
   • Anorectal Surgery

3. The resident will be able to provide suitable postoperative management in the recovery room and will provide postoperative analgesia by a number of techniques including epidural narcotic pain relief when appropriate.

4. The resident will be able to discuss the effects of abdominal surgery on pulmonary function postoperatively.

5. The resident will be able to describe the following potential complications:
   • Pulmonary Complications
• Postoperative Intestinal Dysfunction

6 The resident will be able to decide which patients are appropriate for consideration of endoscopic surgical techniques.

7 The resident will be cognizant of the relative and absolute contraindications, and the risks/benefits of endoscopic surgery.

8 The resident will be able to describe the physiologic implications of endoscopic abdominal surgery including the effects of:
   • Positioning
   • CO₂ Pneumoperitoneum

9 The resident will describe the indications for conversion to an open procedure.

10 The resident will be able to describe the various types of lasers and their uses in surgery.

11 The resident will be cognizant of the hazards of laser surgery and will know the appropriate precautions.

12 The resident will be able to describe the management of an airway fire.

G. Anaesthesia for Orthopedic Surgery and Trauma

Objectives:
5. The resident will be able to perform a detailed preoperative assessment and preparation of the patient for Orthopedic Surgery including the appropriate management of a patient’s:
   • Concomitant Disease
   • DVT prophylaxis

6. The resident will be able to outline the pros and cons of various anaesthetic techniques. The resident will know the Risks/Benefits of GA vs Regional

7. The resident will be able to outline the anaesthetic considerations in:
   • major lower extremity arthroplasty surgery
   • spinal surgery
   • shoulder surgery
   • fractures
   • surgery under tourniquet
   • cement implantation syndrome

8. The resident will be able to select and perform the necessary procedures for appropriate postop pain management.

9. The resident will be able to recognize and treat postop complications such as:
   • fat embolism
   • pulmonary embolism
   • compartment syndrome

10. The resident will know the ATLS Trauma Protocol and the role of anaesthesia in the assessment and initial stabilization of the trauma patient.

11. The resident will know the assessment and management principles in Acute Trauma for the following problems:
    • Blunt Trauma
    • Penetrating Trauma
    • Airway Trauma/Airway Management
• Head and Spinal Cord Injury
• Thoracic Trauma
• CVS Trauma
• Abdominal Trauma
• Major Orthopedic Trauma
• Hypotension in the trauma patient

12. The resident will have a plan for the management of the acutely traumatized patient in the OR.

13. The resident will be able to coordinate the management of the trauma patient who returns to the OR for repeated surgical procedures.

**H. Regional Anaesthesia / Acute Pain Management Rotation**

The goals and objectives of this rotation are built upon the core program lectures in pharmacology and regional anesthesia. There will be clinical correlation with rotations in obstetrical, paediatric, ophthalmic anaesthesia rotations as well as the chronic pain rotation.

**Goals:**

1. The resident will understand the clinical pharmacology of local anaesthetic drugs.

2. The resident will appreciate the indications and contraindications of regional anaesthesia for a variety of surgical conditions.

3. The resident will demonstrate clinical acumen in the selection and preparation of patients for regional anaesthesia, skill in the performance of the block and in the conduct of the remaining time of the anaesthetic.

4. The resident will be able to recognize, investigate and treat common acute problems arising from nerve blocks. The resident will recognize, treat and organize a management plan to deal with late complications of regional blockade.

**Objectives:**

1. The resident will know the pharmacology of commonly used local anaesthetics (LA) with regard to toxicities, clinical dosages, duration of action, metabolism and implications of additives.

2. The resident will know the anatomy required for safe neuraxial blockade, the physiologic affects of these blocks, measures to prevent patient injury, and the recognition and treatment of common and life threatening complications.

3. The resident will know the indications, contraindications and complications of various approaches to blocks of the brachial plexus, lumbosacral plexus, sacral plexus and coeliac plexus.

4. The resident will show competence in peripheral nerve blocks, as well as strategies to minimize complications from these blocks.

5. The resident will be able to select an agent for and perform a safe intravenous regional block, will understand the risks and be able to treat complications.

**Acute Pain Management:**

1. The resident will be able to describe the anatomy and physiology of pain pathways

2. The resident will state the neuroendocrine response to acute pain and its effects of major organ systems.
3. The resident will have knowledge of the clinical pharmacology of the opioid and non-opioid (tricyclics, NSAIDS, alpha agonists, anticonvulsants) treatment of acute pain including the use of:
   - systemic opioids
   - non-opioid analgesics
   - PCA
   - Regional techniques including nerve blocks

4. The resident will be able to outline the advantages of one pain relief delivery system over another, and give specific doses, rates and details of these delivery systems.

5. The resident will describe and treat common and life threatening adverse reactions to medications used to treat acute pain.

6. The resident will demonstrate knowledge of the policies which must be in place to safely and effectively treat acute pain, monitor its efficacy and promote safety within a multidisciplinary team.

7. The resident will communicate clearly with the patient and other members of health care team as to the expectations and strategies of individual pain management.

I. Anaesthesia for Genitourinary Surgery

Objectives:
1. The resident will be able to perform an appropriate preoperative evaluation, and suitably prepare and premedicate a patient for this type of surgery as well as take into account any concomitant disease.

2. The resident will be able to describe the anaesthetic considerations for:
   - nephrectomy
   - lithotripsy
   - prostate surgery
   - percutaneous nephrolithotomy

3. The resident will know how to manage postoperative complications such as:
   - TURP syndrome
   - Pain

J. Ambulatory Anaesthesia

Objectives:
7. The resident will be familiar with and able to demonstrate the appropriate preoperative assessment, preparation and premedication in an ambulatory setting to include consideration of:
   - NPO status
   - Drugs that reduce the risk of aspiration
   - Postoperative nausea treated preoperatively
   - Anxiolytics, sedatives, and opioids
   - Chronic medications

8. The resident will be able to appropriately select patients suitable for ambulatory anaesthesia including the following considerations:
   - Length of surgery
   - Need for transfusion
   - Concomitant disease
9. The resident will be familiar with the salient features of the design and management of a facility catering to efficient ambulatory anesthesia.

10. The resident will be able to describe appropriate anaesthetic techniques for ambulatory anaesthesia including:

11. Appropriate selection of general, regional, sedation, or local anaesthesia
   - Intraoperative consideration of postoperative problems
     - Pain
     - Time in PACU
     - Nausea/vomiting
   - Appropriate selection of:
     - Muscle relaxants, narcotics, local anaesthetics
     - Airway intervention
   - Considerations for regional techniques
     - Postoperative arrangements following central neuraxial blocks and plexus blocks
   - Monitored anaesthesia care techniques

12. The resident will be able to describe:
   - Discharge criteria and patient instruction
   - Criteria for hospital admission

13. The resident will have a plan for postoperative complications.

K. Anaesthesia for ENT Surgery

Objectives:
1. The resident will be able to describe the basic anatomy of the larynx.

2. The resident will understand the hazards, scientific principles, and anaesthetic approaches to laser surgery on the larynx.

3. The resident will list the anaesthetic problems anticipated in a patient presenting for tracheostomy.

4. The resident will discuss the determinants of pressure in the middle ear and will be able to list the effects of $N_2O$.

5. The resident will manage patients with a variety of upper airway pathology. This must include:
   - congenital anomalies affecting the upper airway (for example, Treacher Collins and Pierre Robin syndrome)
   - epiglottitis
   - croup
   - cancer affecting the upper airway
   - post tonsillectomy bleeding
   - tonsillar abscess
   - trismus

6. The resident will be able to describe the anaesthetic considerations for the following surgery:
   - nasal surgery
   - tonsillectomy/adenoidectomy
   - laryngoscopy/laryngeal surgery
   - bronchoscopy
• ENT tumors
• ENT infections
• facial trauma
• tracheostomy
• induced hypotension

7. The resident will have a plan for the postoperative pain management for patients having ENT surgery.

L. Anaesthesia for Plastic Surgery

Objectives:
2. The resident will be able to list the anaesthetic considerations in:
   • Burn patients
   • Quadriplegic patients
   • Major reimplantation surgery
   • Cosmetic surgery

M. Ophthalmologic Anaesthesia

Objectives:
9. The resident will be familiar with the preoperative assessment and preparation necessary for these patients. In particular the resident will be familiar with:
   • concomitant diseases
   • considerations re: intraocular pressure
   • effects of ophthalmologic medications

10. The resident will develop the communication skills necessary to engage and secure the cooperation of the elderly ambulatory care patient.

11. The resident will be familiar with the anatomy, technique of and complications of Retrobulbar and Peribulbar Blocks.

12. The resident will know the implications and cardiovascular management of the oculocardiac reflex.

13. The resident will be able to list the anaesthetic considerations in:
   • Open eye injuries
   • Cataract Surgery
   • Retinal Surgery
   • Strabismus Surgery

14. The resident will be able to recognize manage and formulate therapy for common PARR ocular injuries.

N. Anaesthesia in Remote Locations

Objectives:
4. The resident will be familiar with the special considerations associated with the location and personnel available in locations outside the OR.

5. The resident will be familiar with issues such as:
• Appropriate patient selection
• monitoring
• transport
• recovery

6. The resident will be able to list the considerations in anaesthesia for:

- radiologic procedures - MRI, CT, Angiography
- cardioversion
- Emergency room procedures
- ECT

**O. Dental & Orofacial Surgery**

**Objectives:**
2. The resident will be able to list the anaesthetic considerations in:

- Maxillary / Mandibular surgery
- Anaesthesia in a dental office
- Dental surgery in an uncooperative patient

**P. Geriatric Anaesthesia**

**Objectives:**
1. The resident will be able to discuss:

- Physiologic effects of aging, especially:
  - CNS
  - Respiratory System
  - Cardiovascular System
- Pharmacologic Considerations
  - Drug Distribution / Metabolism / Pharmacodynamics in the elderly
  - Patient Medications
  - Effects of Anaesthesia interacting with the patients medications

2. The resident will be able to discuss and will demonstrate knowledge of such anaesthetic considerations as:

- Positioning
- Temperature Control

3. The resident will provide a plan of postoperative management for:

- hypoxemia
- confusion
- placement

**Q. Anaesthesia for Patients with Systemic Disease**

**Objectives:**
The resident will be able to describe the anaesthetic considerations for patients with:

1. Endocrine Disease
• Diabetes
  • Insulin dependent
  • Diabetic Ketoacidosis
  • Nonketotic hyperglycemic coma
• Thyroid Disease
  • Hypo- and Hyper-thyroidism
• Parathyroid Disease
  • Hypo- and Hyper-parathyroidism
• Pituitary Disease
• Adrenal Disease / Pheochromocytoma
  • Conn’s syndrome
  • Cushing’s Disease
• Carcinoid

2. Renal Disease
• Evaluation of renal function
• Effects of renal disease on pharmacokinetics
• Physiology of the anephric patient
• Renal transplantation
• TURP
• Minor urologic surgery
• Strategies for preservation of renal function during anaesthesia

3. Liver Diseases
• Cirrhosis
• Hepatic coma
• Malnutrition and the parenterally nourished patient
• Viral Hepatitis

4. Collagen Vascular & Neuromuscular Disease
• Rheumatoid Arthritis
• SLE, scleroderma, Ankylosing Spondylitis
• Myopathies, Myasthenia Gravis, Myotonia, Muscular Dystrophy
• MH
• Guillain Barre
• Parkinson's Disease

5. Haematologic Disease
• Hemoglobinopathies
• Hemolytic Anaemias
• Hemophilia
• Von Willebrand's Disease

6. Malignancy
• Paraneoplastic Syndromes
• Effects of Chemotherapeutic Agents

7. Genetic Disorders
• Turner's Syndrome
• Trisomy 21

8. Infectious Diseases
• AIDS
• Concurrent URTI
• Other Systemic Infection / Sepsis

9. Substance Abuse
• Acute intoxication
• Chronic addiction

10. Morbid Obesity

R. PACU

Objectives:
1. The resident will understand and be able to describe:
   • Necessary Facilities and Staffing
   • Monitoring Standards

2. The resident will know when to transfer patients to PACU and what monitoring is necessary for this

3. The resident will write PACU orders.

4. The resident will be able to list PACU Discharge Criteria.

5. The resident will be able to treat the following complications in the PACU:
   • PONV
   • respiratory problems
   • CVS
   • CNS
   • pain
   • hypo/hyperthermia

S. Chronic Pain Management

Goal:
At the end of the rotation the resident will be able to obtain a complete pain history and perform a directed physical examination. The resident will then formulate a comprehensive pain diagnosis as to the pain syndrome, anatomic origin of the pain, and the pathophysiologic etiology. Based on these, the resident will outline a multidisciplinary approach to pain management including treatment of the underlying cause as well as nonpharmacologic and pharmacologic analgesic interventions.

Objectives:
1. The resident will obtain a pain history, and perform a pain physical examination including diagnostic provocative maneuvers.

2. Based on the information from the patient's history and the physician's examination, the resident will formulate a differential diagnosis of the pain.

3. The resident will outline a diagnostic plan appropriate to establish the diagnosis consistent with an understanding of the principles of chronic pain management and utilizing such modalities as:
   • Medications
• Psychological Support
• Physiatric and Orthotic techniques
• Regional techniques, nerve blocks
• Neuroablative techniques
• Neuroaugmentative techniques
• spinal cord stimulation
• TENS
• Acupuncture

4. The resident will discuss pharmacologic interventions including:
   • opioid administration and selection of an appropriate delivery system
   • definition of a failed trial of opioid therapy and its management
   • adjuvant analgesic agents and non-opioids

5. The resident will characterize the following pain syndromes and formulate an appropriate assessment and treatment strategy for each:
   • bone pain
   • visceral pain
   • neuropathic pain
   • dysesthetic
   • neuralgic
   • nociceptive
   • incident pain
   • chronic non-malignant pain
   • fibromyalgia
   • failed back pain
   • abdominal wall pain

6. The resident will be able to discuss the principles associated with the organization of a multi-disciplinary pain service.

T. Cardiopulmonary Resuscitation

Objectives:
1. The resident will know:
   • Physiology of CPR
   • ACLS Protocol
   • Specific Algorithms
   • Current Controversies
   • Pharmacology of Resuscitation Drugs
   • Neonatal and Paediatric Resuscitation

U. Airway Management

The goals and objectives for this rotation are built upon the basic and clinical science objectives outlined for the Pulmonary Block lectures, and the Pulmonary Medicine rotation. Educational experiences for the resident will include hands on skill, reading, and use of instructional videos. These opportunities may require residents to be more intentional in requesting room assignments from the OR Managers.

Goal:
The resident will be able assess the airway in the clinical spectrum of emergent and non-emergent situations, and have a variety of techniques to secure and protect it. The resident will show mastery in the decision and ability to secure the airway safely prior to inducing anaesthesia. The resident will know the ASA Airway Management Algorithm and use it as template to guide decisions in airway management.

**Objectives:**

1. The resident will know the anatomy of the airway (including the sensory and motor innervation), from the naso-hypopharynx to the third bronchial division. The resident will know in all age groups the typical distances from the nares to carina, incisors to carina, length of the trachea from glottis to carina, and the length of the mainstem bronchi.

2. The resident will describe the relevant anatomical considerations in performing nerve blocks of the airway, their safe administration and effects.

3. The resident will describe the physiologic responses to tracheal intubation and know strategies to attenuate these responses.

4. The resident will describe the pathophysiologic process of laryngospasm, be able to list the predisposing factors, and know how to deal with this situation when it arises.

5. The resident will indicate the physiologic consequences of converting from negative pressure to positive pressure ventilation.

6. The resident will know the anatomic and pathophysiologic conditions that predict difficulty in securing an airway and providing adequate ventilation. Given this clinical determination the resident will outline what further diagnostic modalities will define this perceived risk further.

7. The resident will know the common (Mallampati, Mallampati-Samsoon) scoring systems for grading difficult intubation, their weaknesses, limitations and predictive power.

8. The resident will recognize the clinical signs of airway obstruction in a spontaneously ventilating patient, state the complications of this, and outline a plan of management to relieve the obstruction.

9. The resident will understand and have strategies to address the risk of pulmonary aspiration to the airway and tracheobronchial tree, outline the pathophysiologic consequences of pulmonary aspiration, and state the treatment of acute and chronic pulmonary aspiration syndromes.

10. The resident will outline methods to confirm successful endotracheal intubation, and state the situations that compromise the reliability of each method.

11. The resident will describe the indications, contraindications and problems associated with the following common airway procurement strategies:
   - oral intubation
   - nasotracheal intubation
   - fibreoptic intubation
   - laryngeal mask and other airway assists
   - esophageal obturator airways
   - tracheostomies
   - jet ventilation (transtracheal and translaryngeal)

12. The resident will identify the common laryngoscope blades by name, their potential uses and limitations.

13. The resident will identify and select by size appropriate airway equipment including the commonly used tracheal and endobronchial tubes and blockers.
14. The resident will identify common adjunctive devices that can be used to assist in securing the difficult airway.

15. The resident will be knowledgeable with the following aspects of fibreoptic devices:
   - the physics involved in fiberoptic instruments
   - their design, construction and maintenance
   - preparation of the patient (psychological and pharmacologic) and fibreoptic device for intubation.

16. The resident will know how to assemble, insert and effectively ventilate via a transtracheal jet ventilation system and be aware of complications of this technique.

17. The resident will discuss the components of the rapid sequence induction, its contraindications and indications.

18. The resident will demonstrate correct use of and continued practice with:
   - oral and nasal intubation
   - C O P A
   - insertion and use of the laryngeal mask airway
   - insertion of double lumen tubes
   - blind intubation techniques
   - inhalational inductions
   - techniques to secure the airway with the patient awake.

19. The resident will know when and how to manage extubation of the patient.

20. The resident will have knowledge of the different classifications of breathing circuits and will understand the flow characteristics necessary in ventilated and spontaneously breathing patients.

21. The resident will know how to manage an anaesthetic for Laser surgery to the airway.

V. Community Anaesthesia

At the present time, community learning experiences may be set up in variety of locations. To meet the guidelines of the RCPS, clear objectives must be stated prior to individual site acceptance. In general the following objectives apply:

Objectives:
1. The resident will learn decision making in the absence of tertiary care technological resources.

2. The resident will practice autonomy with independent decision making in the absence of other medical specialty resource personnel.

3. The resident will be exposed to the evolution of common disease processes.

4. The resident will manage the diagnosis, treatment and outcome analysis of patients not normally seen in the tertiary care environment.

5. The resident will experience different departmental procedures, practices and policies.

W. Acute Problem Management and Emergency Procedures

Goal:
Given a patient who develops an acute anaesthetic problem in the perioperative period, the resident will give a concise differential diagnosis and start appropriate therapy. The resident will provide appropriate follow up care.

**Objectives:**
The resident will manage:
- perioperative hypertension or hypotension
- perioperative cardiac arrhythmias
- anaphylaxis or anaphylactoid reactions
- laryngospasm
- regurgitation and aspiration of gastric contents
- malignant hyperthermia
- unrecognized difficult intubation
- perioperative hypoxemia and/or hypercapnia
- perioperative oliguria or polyuria
- perioperative bronchospasm
- transfusion reactions
- disseminated bleeding
- air embolism
- coma
- complications of regional anaesthesia (including inadvertent intravascular or subarachnoid injections and postoperative neurological deficits)
- full stomach

The following examples outline the scope of the expected knowledge, skill and attitudes in some emergency situations.

**1. Establishing and Maintenance of Airways**

**Example #1:**

**Goal:**
Given a 65-year-old-male in the hospital for cholecystectomy who suddenly stops breathing and is cyanotic, the resident will establish and maintain an airway, recognize the cause, and restore normal respiratory function, if possible.

**Objectives:**
1. Describe the normal anatomy and physiology of the respiratory tract and respiration.
2. List three common causes of obstruction of the oropharynx, trachea, and larynx.
3. List the one most common cause of bronchial obstruction.
4. List four common causes of obstruction occurring in the bronchioles and alveoli.
5. List five clinical findings associated with respiratory arrest.
6. List the three critical clinical findings of respiratory arrest.
7. List four categories of causes of respiratory arrest.
8. List, in order, the corrective steps for the treatment of acute respiratory obstruction.
9. Demonstrate ability to relieve respiratory obstruction, establish breathing with and without mechanical aids, and take corrective measures in the treatment of respiratory arrest.
10. Outline the further diagnostic studies indicated for evaluation of respiratory arrest.

**Example #2:**

**Goals:**
Given a 32-year-old patient, who, on the fourth postoperative day following a radical hysterectomy, complains of sudden onset of chest pain and dyspnea, the resident will be able to evaluate the patient properly to determine the diagnosis or differential diagnosis, provide immediate supportive care, institute further diagnostic measures, and carry out a plan for long-term management.
Objectives:
1. List the conditions or states that place a patient at high risk for the development of thromboembolism.
2. List the five most common symptoms associated with pulmonary embolism.
3. Discuss the common physical findings in patients with pulmonary embolism.
4. Discuss the usual findings of arterial blood gas, chest x-ray, ECG, lung scan, and pulmonary arteriogram in patients with pulmonary embolism.
5. Discuss the value of ultrasound and labeled fibrinogen scanning in localizing sites of thrombus formation.
6. List at least four other conditions that have clinical presentations similar to pulmonary embolism and discuss the differentiation of these conditions from one another.
7. Outline the necessary initial life-supporting measures to be employed in patients with pulmonary embolism.
8. Outline a program of long-term management of patients with pulmonary embolism, and describe methods of evaluating the patient's progress.
9. Discuss the indications for pulmonary embolectomy and for inferior vena cava ligation or placation.
10. Describe the clinical and laboratory findings of pulmonary edema.
11. Outline a plan of initial and long-term management for a patient with pulmonary edema.
12. Describe the factors predisposing a patient to the development of pulmonary edema and discuss preventative measures that might be employed.
13. Differentiate between pulmonary thromboembolism and amniotic fluid embolism in terms of (a) patients at risk, (b) clinical presentation, (c) indicated diagnostic measures, (d) initial therapy, and (e) long-term management.

2. Cardiac Arrhythmias
Goal:
Given a patient who is suddenly pulseless or has an irregular pulse and chest pain or dyspnea, the resident will diagnose the problem and initiate appropriate emergency treatment.

Objectives:
1. Discuss the anatomy and physiology of SA and AV nodal activity, cardiac conduction mechanism, pumping action, oxygenation, elimination of CO2, and central and peripheral nervous system control of respiration, blood pressure, and blood flow.
2. Discuss the use of the following drugs in cardiac emergencies, including indication, contraindication, side effects, dosages, and route of administration: lidocaine, atropine, epinephrine, sodium bicarbonate, digitalis, isoproterenol, calcium gluconate, and propanolol.
3. List the dangerous and potentially lethal cardiac arrhythmias, and demonstrate ability to diagnose each of them from ECG rhythm strip.
4. Discuss the use of mechanical and electrical aids to the circulatory system, including indications, technique, and mode of action for each.
5. Outline in flow-chart fashion the steps in cardiopulmonary resuscitation.
6. Discuss the indicated further studies to determine etiology of cardiac arrhythmias and life threats.
7. Demonstrate ability to diagnose acute myocardial infarction from ECG.

3. Coma
Goal:
Given a comatose patient, the resident will perform an appropriate physical examination, establish a working diagnosis, and initiate emergency treatment.

Objectives:
1. List five of the most common causes of coma.
2. Discuss the important historic, physical, and laboratory findings associated with each of the above causes of coma.
3. List the pertinent laboratory and other studies that should be obtained for evaluation of coma of unknown cause.
4. Outline the emergency treatment of each of the above causes of coma;
5. Demonstrate ability to establish appropriate life-support systems for the comatose patient.
4. Allergic Emergencies

Goal:
Given a patient who has just received 5 million units of penicillin intravenously for treatment of pelvic abscess, and who shortly thereafter is noted to have a rash on the arms and face and difficulty in breathing, the resident will recognize the life-threatening aspects of this situation and institute therapeutic measures to treat this condition.

Objectives:
1. Define anaphylaxis and list the common clinical manifestations.
2. List the other associated alterations in physiology, for example, the effects on blood pressure, pulse, respirations, and circulation.
3. List the five most common causes of anaphylaxis.
4. Discuss the spectrum of allergic reactions, from the mildest to the life-threatening forms.
5. Differentiate anaphylactic shock from shock due to ruptured tuboovarian abscess and due to pulmonary embolism.
6. State the two most likely causes of death in such a patient.
7. List in order of importance the necessary steps in the management of this patient.
8. List three preventive measures that should be employed to reduce the likelihood of anaphylaxis.
9. List the three most commonly used drugs in the management of anaphylaxis, the indication for their use, the mechanism of action of each, dosage of each, side effects, and contraindications.

5. Drug Problems

Goal:
Given a 26 year-old gravida 2 para 1 female at approximately six months' gestation who arrives in the labor and delivery suite appearing alternately sedated, agitated, and disoriented, the resident will recognize and treat any life-threatening conditions, determine the etiology of the problem, and carry out acute and long-term treatment.

Objectives:
1. List five commonly abused classes of drugs and their effects on respiration, circulation, behavior, and the fetus. Include the variations of the same drug in different patients.
2. Describe the clinical syndrome of the newborn infant of a heroin addict.
3. List two medical conditions that may be confused with drug abuse and discuss the differentiation of these.
4. List in order of importance five life-threatening aspects of drug abuse.
5. Describe the evaluation of a drug-abuse patient.
6. Outline a treatment plan for drug abuse, including the known drug antagonists.

6. Emergency Procedures

Goal:
The resident will demonstrate competence in the performance and understanding of the emergency procedures listed below and list the indications, and contraindications for each. (Where patients are not available, simulation models are acceptable.)

- closed-chest massage
- endotracheal intubation
- cardiac electroconversion
- insertion of oropharyngeal airway
- intracardiac injection
- ECG rhythm strip interpretation
- venous cutdown
- bag and mask ventilation
- mouth-to-mouth resuscitation
X. Complications of Anaesthesia

Objectives:
The resident will know how to diagnose and manage anaesthesia complications such as:

1. CNS
   - awareness under anaesthesia
   - acute postoperative confusional state
   - CVA
   - hypoxic encephalopathy

2. Respiratory
   - upper airway
     - dental trauma
     - laryngospasm, laryngeal trauma, laryngeal edema
   - esophageal perforation
   - aspiration
   - negative pressure pulmonary edema
   - pneumothorax

3. CVS
   - myocardial ischemia and infarction
   - dysrhythmias
   - congestive heart failure

4. Miscellaneous
   - anaphylaxis
   - MH
   - halothane hepatitis
   - complications of positioning

Y. Crisis Resource Management

Objectives:

1. The resident will know:
   - Minimal monitoring standards
   - Anticipation of problems according to procedure, patient condition

2. The resident will be able to define the difference between emergent, urgent and elective cases, and communicate this.

3. The resident will be aware of the utilization of resources available in and outside OR

4. The resident will be aware of at least one model (eg. SRK model) of crisis resource management

Z. Consults and the Pre-anaesthesia Assessment Clinic (PAC)

General Objectives:
The resident will learn to:

7. Reduce patient perioperative morbidity by screening patient data and initiating further patient encounters / investigations as appropriate.
8. Perform preoperative anaesthetic assessments with accurate assessments of the airway and cardiorespiratory systems.

9. Know the common anaesthetic classification systems (i.e.) ASA status, NYHA, Mallampati, etc.

10. Address patient inquiries as to pertinent complications and risks of anaesthesia.

11. Appreciate the costs involved for preoperative consultation, testing and preparation for anaesthesia and be able to describe the key factors in the organization of an anaesthesia consult clinic.

12. Maintain a consultant and professional profile in the medical and public domains.

**Specific Objectives:**

The resident will:

15. Become proficient in airway evaluation including familiarity with common diagnostic imaging of the airway.

16. Improve skills at directed history and physical examination.

17. Develop communication skills in preoperative consultation to benefit the patient, the referring physician, and the consultant.

18. Identify patients who require further necessary preoperative preparation, consultant or investigation.

19. Appreciate the role of specialized cardiac investigation, their basic principles of interpretation and limitations, their cost and benefit.

20. Learn effective outpatient preparation strategies for surgical patients presenting with common medical problems such as asthma, diabetes mellitus, ischemic heart disease, etc.

21. Recognize the difficulties and limitations of screening patient problems.

22. Develop anaesthetic management plans with consultant anaesthetists.

23. Inform patients as to the pain management services available to them.

24. Address the role and indications for common preoperative therapies (anxiolytics, bronchodilators, antisialagogues, steroids.

25. The resident will know the following when writing consultation notes:
   - appropriate organization
   - dissemination of information
   - advice/recommendations
   - format, length

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