



CANADIAN SOCIETY OF RESPIRATORY THERAPISTS
SOCIÉTÉ CANADIENNE DES THÉRAPEUTES RESPIRATOIRES

National Competency Framework In Anesthesia Assistance

Validated June 2016

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INTRODUCTION

The National Competency Framework for Anesthesia Assistance (NCF AA) is a practical tool for use by educators, accreditors and students for the design and maintenance of education programs in anesthesia assistance. Employers and managers will rely on the NCF AA for performance appraisal, professional development as well as for promotion and recruitment purposes. In addition, the public, other health care professionals, governments, industry, and other stakeholders will use the AA NCF to obtain guidance regarding the practice and competencies of anesthesia assistants.

All stakeholders involved with the development of this document strongly oppose independent practice by anesthesia assistants. The intent of this document (*National Educational Competency Framework for Anesthesia Assistance*) is to identify the knowledge and competencies required by anesthesia assistants to provide safe anesthesia care under the direction of the attending anesthesiologist in accordance with provincial regulations as well as recommendations from the Canadian Anesthesiologists' Society.

ACKNOWLEDGEMENTS

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HISTORICAL PERSPECTIVE

Since 2002, the Canadian Society of Respiratory Therapists (CSRT) has worked collaboratively with stakeholders to define the scope of activities and duties of an anesthesia assistant. The project involved analyzing the occupation in order to identify the skills and knowledge necessary for safe and competent practice. An initial compilation of the Anesthesia Assistant Specialist Occupational Profile was created from the course outlines from Thompson Rivers University, the Michener Institute for Applied Health Sciences and Vanier College as well as from the approved skills profile from the Province of Quebec.

Due to the rapid evolution of the anesthesia assistant role across Canada, the CSRT facilitated workshops between 2005 to 2008 that included educators, clinical practice representatives as well as national professional organizations such as the Canadian Anesthesiologists' Society (CAS), the Association of Canadian University Departments of Anesthesia (ACUDA) and the National Association of PeriAnesthesia Nurses of Canada (NAPANc), the Canadian Nurses Association (CNA) and the National Alliance of Respiratory Therapy Regulatory Bodies (NARTRB). The intention was to define the foundation knowledge required for the safe and competent practice of anesthesia assistants. In 2009, the CAS established the AA Task Force and, through a continued collaborative inter-professional approach, built on the CSRT's AA Foundation Knowledge document to develop the "National Educational Framework for Anesthesia Assistants". This 2010 document was endorsed by the CSRT, the CAS, ACUDA and NAPANc. This document required performance indicators to allow it to be used for curriculum development by AA Education Programs.

In March 2011, the CSRT facilitated a workshop where educators from AA programs and across Canada as well as CAS/ACUDA were invited to participate in the development of performance indicators for the "National Educational Framework for Anesthesia Assistants". The result was an un-validated "National Competency Framework for Anesthesia Assistants". This document was distributed to AA education programs and programs started adapting their curriculum accordingly.

In May 2014, the CSRT launched the AA-CSRT Certificate to recognize RTs, RNs and other health professionals who had completed the AA education program or had achieved the AA competencies through professional clinical experience.

In early 2015, the CSRT Board of Directors established as a priority the validation of the AA Competency Framework and the establishment of an inter-professional AA Certification Workgroup. The objectives of the inter-professional AA Certification Workgroup included: (1) the validation of the AA National Competency Framework; (2) the development of an inter-professional national certification exam for new AA graduates; (3) the establishment of an inter-professional national accreditation process for AA education programs.

The inter-professional AA Certification Workgroup included:

- Two individuals with perspective of the RT who have graduated from an AA education program and are practicing clinical AA RT (selected by CSRT)
 - Tammy Fagan (NL) and John Patton (BC)
- Two individuals with perspective of the RN who have graduated from an AA education program and are practicing clinical AA RN (selected by ORNAC and/or NAPANC)
 - Jared Campbell (MB) and Wendy So (ON)
- One individual with perspective of the practicing anesthesiologist (selected by the CAS)
 - Dr. Patricia Houston (ON)
- One individual with the perspective from an anesthesiologist involved in AA education (selected by ACUDA)
 - Dr. Michael Murphy (AB)
- One individual with the perspective of the AA education program coordinator
 - Susan Dunington (Michener – ON)
- One individual with the perspective of the exam corporation (selected by CBRC)
 - Faylene Funk (MB)
- One individual with the perspective of the accreditation services (selected by CoARTE)
 - Carolyn McCoy (NB)
- One individual with the perspective of clinical assistants / physician assistants working as an AA
 - Mark Ratz (MB)
- One individual with the perspective of international medical graduate working as an AA
 - Regina Kostetsky (MB)
- One individual with the perspective of AA practicing in Quebec
 - Marco Zaccagnini (QC)

From CSRT – Jessie Cox, CSRT President – Chair of the workgroup
 David Sheets – CSRT Board member with AA perspective
 Christiane Menard – CSRT Executive Director and project administrator

As of July 2016, the National Competency Framework for Anesthesia Assistance has been validated; the inter-professional certification exam committee has been established; and the inter-professional accreditation process for AA education programs has been confirmed. As such the mandate of the inter-professional AA Certification Workgroup has been completed.

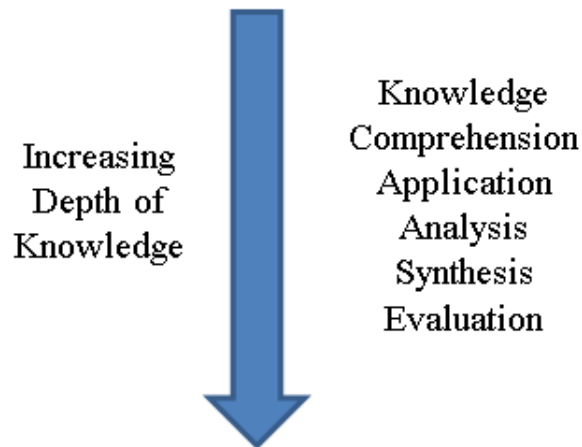
UNDERSTANDING THIS DOCUMENT

The requirements for anesthesia assistants as presented in this document are divided into three levels: Competency, Performance Indicators and Foundational Knowledge. The performance indicators allow for the assessment and measurement of the performance of each competency. The foundational knowledge outlines the information that an anesthesia assistant must know and comprehend in order to safely perform each competency.

The Foundational Knowledge section for each competency may include bulleted items. These items, when following the phrase “such as” are examples and not intended to be a comprehensive list; items following the phrase “including” must be covered but are not intended to be a complete list. *(Note: Bulleted lists were arranged alphabetically, unless there was a logical order such as a commonly-understood sequence of steps. The order of the bullets bears no impact on the importance of the content.)*

The depth of knowledge associated with the academic material is reflected in the verb selected for the academic objectives.

The taxonomy consists of 6 levels:



It works on the principle that if you are functioning at one level, you must have accomplished the previous levels (i.e.: *Application* requires you to *Comprehend* what you are doing. If you *Comprehend* what you are doing then you must have *Knowledge* of it.) A description of the levels and a list of these verbs and their classification is outlined in Appendix A: Bloom's Taxonomy. This background information will apply to the various academic objectives outlined in this document. It is assumed that once mentioned it applies to all subsequent academic objectives.

SECTION 1: PROFESSIONAL AND ORGANIZATIONAL COMPETENCIES

It is recognized that individuals entering the AA programs are health professionals and have attained a background level of competency in the elements outlined in Section I.

Foundation knowledge is therefore not included in this section.

A. Demonstrate professionalism toward patients and their families, co-workers and the public

Performance Indicators

1. Use professional language, behaviour, and attire
2. Function within professional, medical, legal and ethical guidelines/regulations
3. Adhere to training institution's mission, vision and values
4. Demonstrate dependable and self-directed behaviour in assuming responsibilities
5. Accept constructive criticism and act on it in a professional manner

B. Demonstrate effective communication with the patient and their families, co-workers and the public

Performance Indicators

1. Communicate effectively with physicians, staff and patients
2. Maintain documentation and records

C. Demonstrate critical thinking and reasoning

Performance Indicators

1. Demonstrate critical judgment in professional practice
2. Adjust to unexpected circumstances
3. Respond appropriately to changing situations
4. Adhere to quality assurance guidelines
5. Demonstrate problem solving skills
6. Anticipate problems
7. Recognize the early signs of a changing situation
8. Continually assess situations
9. Foresee adverse outcomes
10. Demonstrate planning skills
11. Implement plans, decisions and procedures
12. Demonstrate evaluation skills
13. Troubleshoot equipment
14. Prioritize work
15. Recognize a fixation error

D. Ensure the health and safety of the patient, co-workers and self

Performance Indicators

1. Carry out procedures and operations with respect to the Workplace Hazardous Materials Information System (W.H.M.I.S.)
2. Use personal protective equipment as warranted
3. Utilize infection control procedures
4. Adhere to manufacturer and Canadian Standards Association specifications and guidelines in the proper use of equipment
5. Employ manufacturers' recommendations for cleaning and disinfecting equipment

E. Use evidence to inform practice

Performance Indicators

1. Discuss research design, data collection and analysis
2. Evaluate research by Level of Evidence classification

F. Perform administrative duties

Performance Indicators

1. Apply cost containment practices per institution guidelines
2. Participate in equipment preventative maintenance as per manufacturer and Canadian Standards Association specifications
3. Adhere to quality assurance guidelines

G. Demonstrate a commitment to education

Performance Indicators

1. Participate in lifelong learning and ongoing training required to maintain competency of practice
2. Participate in the education of students and other healthcare professionals

SECTION II: ANESTHESIA ASSISTANT COMPETENCIES

A. Administer prescribed pharmacological agents under the direction of the attending anesthesiologist

Performance Indicators

1. Assess the patient's pharmacological requirements in consultation with the attending anesthesiologist
2. Prepare prescribed agents
3. Demonstrate the administration of prescribed agents
4. Titrate prescribed agents to patient response
5. Recognize complications and take corrective action
6. Demonstrate an understanding of the implications of pre-operative medication on the intra-operative course

Foundational Knowledge

- a. Discuss basic terms such as:
 - addictive effect
 - agonist
 - antagonist
 - blood brain barrier
 - concentration
 - contact sensitive half-life
 - half-life
 - receptor
 - synergistic effect
 - tachyphylaxis
 - tolerance
 - volume of distribution
- b. Discuss the principles of pharmacokinetics in terms of:
 - absorption
 - distribution
 - metabolism
 - elimination
- c. Discuss the principles of pharmacodynamics in terms of:
 - dose-response curves
 - mechanisms of action
 - receptor binding

- d. Explain the clinical indications for routes of administration such as:
- inhalational
 - intramuscular
 - intravenous
 - oral
 - rectal
 - subcutaneous
 - sublingual
 - topical
- e. Describe the autonomic nervous system
- f. Predict the effects in terms of anesthetic interactions of drugs such as:
- antibiotics
 - alpha and beta-adrenergic antagonists
 - anticholinergics
 - antihistamines
 - antihypertensives
 - cholinesterase inhibitors
 - sympathomimetics

in terms of:

- dosage and administration
 - indications and contraindications
 - mechanism of action
 - pharmacological effects
 - onset of action
 - side effects
- g. Explain inhalational anesthetics in terms of:
- agent solubility
 - balanced anesthesia
 - compartments of anesthesia
 - diffusion hypoxia
 - interaction with CO₂ absorbents
 - second gas effect

h. Describe the characteristics of inhalational anesthetic agents such as:

- desflurane
- halothane
- isoflurane
- nitrous oxide
- sevoflurane
- xenon

in terms of:

- dosage and administration
- indications and contraindications
- malignant hyperthermia trigger
- mechanisms of action
- onset of action
- minimum alveolar concentration
- pharmacological effects
- side effects

i. Discuss the factors which alter response to inhaled anesthetic agents such as:

- age, gender
- co-morbidities
- duration of surgery
- type of surgery
- pharmacologic interaction

j. Explain the effects of inhalational agents on ventilation:

- airway irritability
- bronchodilation
- pattern of breathing
- respiratory muscle function
- ventilatory response to CO₂

k. Explain the effects of inhalational agents on circulation:

- arterial blood pressure
- cardiac output
- coronary vascular resistance
- heart rate
- myocardial contractility
- right atrial pressure
- stroke volume
- systemic vascular resistance

- l. Compare depolarizing with non-depolarizing muscle relaxants in terms of:
- action on the neuromuscular junction
 - airway management
 - malignant hyperthermia trigger

- m. Explain the pharmacology of muscle relaxants such as:
- atracurium
 - cis-atracurium
 - mivacurium
 - pancuronium
 - rocuronium
 - succinylcholine
 - vecuronium

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- pseudocholinesterase deficiency
- side effects
- reversal (including agents such as sugammadex)

- n. Explain the pharmacology of cholinesterase inhibitors and anticholinergic agents such as:
- atropine
 - edrophonium
 - glycopyrrolate
 - neostigmine

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

o. Explain the pharmacology of sedatives (barbiturates, benzodiazepines, others) such as:

- methohexital
- thiopental
- diazepam
- lorazepam
- midazolam
- dexmedetomidine

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects
- reversal

p. Explain the pharmacology of opiates such as:

- codeine
- fentanyl
- hydromorphone
- meperidine
- morphine
- nalbuphine
- remifentanyl
- sufentanyl

in terms of:

- addiction
- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- nociceptive sensitization
- opiate-induced hyperalgesia
- pharmacological effects
- side effects
- reversal
- tolerance

q. Explain the pharmacology of non-barbiturate intravenous anesthetics such as:

- etomidate
- ketamine
- propofol

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

r. Explain the pharmacology of benzodiazepine antagonists and opioid antagonists such as:

- flumazenil
- naloxone

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

s. Explain the pharmacology of local anesthetics such as:

- bupivacaine
- lidocaine
- eutectic mixture of local anesthetics (EMLA)
- ropivacaine
- tetracaine

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects
- addition of vasoconstrictors

t. Discuss lipid rescue in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

u. Explain the pharmacology of antibiotics such as:

- aminoglycosides
- cephalosporins
- glycopeptides
- lincosamides
- penicillins
- quinolones

in terms of:

- indications and contraindications
- interaction with anesthetic agents
- mode of administration
- timing

v. Explain the pharmacology of antiarrhythmics such as:

- adenosine
- amiodarone
- digoxin
- diltiazem
- lidocaine

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

w. Explain the pharmacology of anticoagulants, antifibrinolytics, antiplatelet agents and thrombolytics such as:

- alteplase
- aspirin
- clopidrogel
- coumadin
- heparin
- low molecular weight heparin
- tranexamic acid

and reversal agents (E.g. protamine), in terms of:

- implications for anesthetic procedures
- indications/contraindications
- mechanism of action
- prophylactic and therapeutic use

x. Explain the pharmacology of nonsteroidal anti-inflammatory drugs such as:

- Non-selective non-steroidal anti-inflammatory drugs (e.g. ibuprofen, ketorolac and naproxen)
- COX II-selective non-steroidal anti-inflammatory drugs (e.g. celecoxib)

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

y. Explain the pharmacology of diuretics in classes such as:

- aldosterone antagonists
- dopamine receptor agonist
- loop
- osmotic
- thiazide

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

z.. Explain the pharmacology of sympathomimetics and other inotropes such as:

- dobutamine
- dopamine
- ephedrine
- epinephrine
- milrinone
- norepinephrine
- phenylephrine
- vasopressin

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- receptor selectivity
- side effects

aa. Explain the pharmacology of antihypertensive agents such as:

- ACE inhibitors (e.g. ramipril)
- alpha blockers (e.g. phentolamine)
- angiotensin receptor blockers (e.g. losartan)
- beta blockers (e.g. esmolol and metoprolol)
- direct vasodilators (e.g. nitroprusside, nitroglycerine and hydralazine)
- mixed alpha/beta blockers (e.g. labetalol)

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

bb. Explain the pharmacology of the following classes of gastrointestinal drugs:

- antacids (E.g. Maalox)
- H₂ blockers (E.g. ranitidine)
- proton pump inhibitors (E.g. omeprazole)

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

cc. Explain the pharmacology of anti-emetic agents such as:

- dopamine antagonists (E.g. metoclopramide)
- serotonin inhibitors (E.g. ondansetron)
- steroids (E.g. dexamethasone)

in terms of:

- dosage and administration
- indications and contraindications
- mechanism of action
- onset of action
- pharmacological effects
- side effects

B. Operate anesthesia equipment

Performance Indicators

1. Predict potential hazards of anesthesia gas delivery
2. Prepare the anesthesia workstation
3. Operate the anesthesia workstation
4. Troubleshoot the anesthesia workstation
5. Perform the anesthesia workstation checkout
6. Perform appropriate patient ventilation using the anesthetic machine
7. Describe a quality assurance program for anesthesia equipment
8. Demonstrate ancillary equipment checks, maintenance, troubleshooting and antisepsis techniques

Foundational Knowledge

- a. Discuss all relevant standards including the Canadian Standards Association and Workplace Safety Standards.
- b. Describe all anesthesia machine components including:
 - auxiliary flow meter
 - common gas outlet
 - cylinders
 - flow control valve
 - gas power outlet for ventilator
 - gas selector switch
 - machine piping
 - master switch
 - oxygen flush valve
 - oxygen pressure failure devices
 - pipeline inlet connections
 - pipeline pressure gauges
 - regulators
 - rotometers
 - second stage regulator
- c. Discuss safety devices on anesthesia gas machines including:
 - alarms
 - minimum oxygen flow
 - minimum oxygen ratio devices
 - pressure relief valves
- d. Evaluate problems, explain troubleshooting techniques and implement corrective actions

- e. Discuss vaporizers in terms of:
- boiling point
 - partial pressure
 - specific heat
 - thermal conductivity
 - thermal stabilization
 - volume percent
 - vapor pressure
- f. Classify vaporizers according to characteristics such as:
- bubble through
 - injection
 - measured flow
 - variable flow
- g. Discuss temperature compensation in vaporizers in terms of supplied heat and thermal compensation
- h. Discuss the effects of high/low atmospheric pressure on vaporizers:
- variable flow vaporizers
 - measured flow vaporizers
- i. Describe the pumping effect and pressurizing effect of intermittent back pressure on vaporizers in terms of:
- factors
 - mechanisms
 - minimizing the pumping effect
- j. Assess the vaporizer for:
- incorrect calibration
 - obstruction of fresh gas flow
 - physical damage
 - servicing requirements
- k. Discuss the arrangement of vaporizers on the anesthesia machine
- l. Describe in-system vaporizers
- m. Discuss mounting systems for vaporizers

- n. Describe potential hazards of vaporizers including:
 - dial position
 - interlock selection
 - leaks
 - overfilling
 - tipping
 - using incorrect agent
- o. Discuss physics as it relates to anesthesia breathing systems
- p. Discuss factors influencing rebreathing in anesthesia breathing systems such as:
 - fresh gas flow
 - mechanical dead space
- q. Discuss the effects of breathing including:
 - alteration of inspired gas tensions
 - anesthetic agents
 - carbon dioxide
 - oxygen
 - retention of water
- r. Discuss the discrepancy between inspired and delivered volumes
- s. Discuss the discrepancy between dialed-in and delivered concentrations including:
 - dilution
 - leaks
 - rebreathing
 - release of anesthetic agent from the system
 - uptake of anesthetic agents by breathing systems
- t. Explain the function of components such as:
 - adjustable pressure limiting (APL) valve
 - breathing circuits
 - one way valves
 - PEEP valves
 - reservoir bag
- u. Compare breathing systems such as:
 - Bain
 - Circle
 - Coaxial circle
 - Mapleson variations

- v. Discuss breathing system adjuncts such as:
 - heat and moisture exchangers
 - heated humidifier
 - filters
 - monitoring systems

- w. Discuss carbon dioxide elimination through anesthesia breathing systems

- x. Evaluate problems, explain troubleshooting techniques and implement corrective actions for breathing systems such as:
 - anesthetic agent overdose
 - excessive airway pressure
 - inadvertent exposure to volatile agents
 - inhalation of a foreign body
 - leaks
 - scavenging malfunctions

- y. Describe the function of components of the ventilator such as:
 - drive mechanism
 - electronic control
 - exhaust valve
 - pneumatic control
 - safety relief valve
 - spill valve

- z. Evaluate and adjust ventilation modes and parameters

- aa. Describe fresh gas flow compensation

- bb. Describe circuit compliance compensation

- cc. Describe the general effects and hazards of exposure to trace levels of anesthetic gases and vapours

- dd. Describe how to control trace anesthetic gases

- ee. Discuss the components of the scavenging system

- ff. Discuss potential hazards associated with scavenging equipment

- gg. Describe techniques and procedures for monitoring trace gases

- hh. Describe causes of unsafe gas delivery such as:
- air entrainment
 - hypoxic gas mixture
 - incorrect gas supply
 - leaks
- ii. Discuss the causes of hypoventilation and hyperventilation
- jj. Discuss the effects of hypoventilation and hyperventilation.
- kk. Describe gas monitoring systems
- ll. Describe techniques for measuring gases such as:
- anesthetic agents
 - carbon dioxide
 - nitric oxide
 - nitrogen
 - nitrous oxide
 - oxygen
- mm. Discuss methods and implications of returning scavenged gas to the breathing circuit
- nn. Describe standards of anesthesia machine checkout as per Canadian Anesthesiologists' Society (CAS) practice guidelines
- oo. Describe anesthetic equipment operational checks as per manufacturer's specifications and relevant standards
- pp. Describe ancillary equipment checks, maintenance, troubleshooting and antisepsis techniques

C. Monitor the patient's physiological status

Performance Indicators

1. Prepare hemodynamic monitoring systems in anesthesia
2. Insert arterial lines
3. Assist with insertion of central venous pressure lines
4. Prepare noninvasive monitoring
5. Apply noninvasive monitors
6. Interpret results of monitoring
7. Perform arterial blood sampling
8. Perform venous blood sampling
9. Analyze blood samples (e.g. point of care)
10. Interpret blood test results and propose corrective action

Foundational Knowledge

- a. Explain the components of fluid-filled monitoring systems including:
 - types
 - electronic components
 - catheter and tubing
 - flush system
 - pressure bags
 - solution selection
- b. Describe the physical principles involved in pressure monitoring
- c. Describe monitoring system assembly
- d. Describe referencing, dynamic response testing, leveling and calibration of system
- e. Describe the effects on hemodynamics of support mechanisms such as:
 - aortic balloon pump
 - extracorporeal life support
 - IVOX
 - ventricular assist device
- f. Explain arterial pressure in terms of:
 - normal values
 - measurement sites
 - waveform morphology
- g. Compare and contrast direct and indirect blood pressure measurement techniques

- h. Describe the clinical applications of arterial blood pressure monitoring in terms of:
 - complications
 - indications/contraindications
 - insertion techniques

- i. Explain central venous pressure in terms of:
 - measurement sites
 - normal values
 - waveform morphology

- j. Describe the clinical applications of central venous pressure monitoring in terms of:
 - complications
 - indications/contraindications
 - insertion techniques, including ultrasound guided

- k. Explain pulmonary artery pressure in terms of:
 - measurement sites
 - normal values
 - waveform morphology

- l. Describe the clinical applications of pulmonary artery pressure monitoring in terms of:
 - complications
 - indications/contraindications
 - insertion techniques

- m. Describe the clinical applications of pulmonary artery occlusion (wedge) pressure monitoring in terms of:
 - complications
 - indications/contraindications
 - insertion techniques

- n. Describe the physiological factors affecting cardiac output as related to anesthesia

- o. Describe cardiac output measurement techniques

- p. Evaluate the clinical significance of derived values including:
 - cardiac index
 - ejection fraction
 - left ventricular stroke work
 - pulmonary vascular resistance
 - pulmonary vascular resistance index
 - stroke volume
 - stroke volume index
 - systemic vascular resistance
 - systemic vascular resistance index

- q. Describe the physiological factors affecting mixed venous oxygen saturation as related to anesthesia
- r. Describe the techniques of continuous monitoring of mixed venous oxygen saturation in terms of:
- indications/contraindications
 - measurement techniques
 - complications
- s. Describe the clinical applications of intracranial pressure monitoring in terms of:
- indications/contraindications
 - management
 - measurement site
 - normal values
 - wave form morphology
- t. For hematological lab parameters such as:
- arterial blood gases
 - albumin
 - complete blood count
 - creatinine
 - electrolytes
 - glucose
 - hemoglobins
 - INR, PTT
 - liver function tests
 - thyroid function tests

explain each parameter in terms of:

- normal value
 - clinical significance
- u. Describe the interpretation of ECG tracings in terms including:
- axis
 - conduction blocks
 - normal sinus rhythm
 - PR interval
 - QT interval
 - ST deviation
 - significant arrhythmias

v. Explain non-invasive monitors such as:

- blood pressure
- capnometry
- cerebral oximetry
- peripheral nerve stimulators
- respiratory rate
- SpO₂
- temperature
- transcutaneous gas

in terms of:

- application
- monitoring sites
- normal values
- technology

w. Describe the clinical applications of ultrasound, including:

- echocardiography

x. Explain the use of nervous systems monitors to maintain/evaluate depth of anesthesia

y. Describe thermoregulation in terms of:

- hyperthermia, malignant hyperthermia and fever
- monitoring
- thermal regulating devices
- thermoregulation during general anesthesia

D. Provide preoperative care

Performance Indicators

1. Conduct a patient interview
2. Perform a preoperative assessment and convey it to the attending anesthesiologist in a concise, organized report
3. Provide preoperative care

Foundational Knowledge

- a. Describe the importance of pre-operative checklists such as the Canadian Patient Safety Institute Surgical Safety Checklist
- b. Describe the components of a comprehensive patient interview, including:
 - allergies and drug reactions
 - current patient situation/required surgery
 - family history
 - functional status
 - laboratory and diagnostic tests results
 - medical history
 - NPO status
 - physical examination
 - smoking, alcohol and drug history
 - surgical/anesthetic history
 - weight/height/BMI
- c. Analyze the clinical significance of patient histories
- d. Review patient information from a variety of sources as needed
- e. Verify information accuracy
- f. Analyze pertinent information, including:
 - cardiovascular
 - endocrine
 - gastrointestinal
 - hematological
 - hepatic
 - neurological
 - neuromuscular
 - renal
 - respiratory

- g. Describe a complete assessment related to anesthesia care
- h. Describe a physical examination as indicated for anesthesia care
- i. Assess laboratory and diagnostic data and relate to patient status
- j. Describe the American Society of Anesthesiologists physical status classification
- k. Determine the American Society of Anesthesiologists physical status based on findings
- l. Determine the need for additional patient assessments such as:
 - cardiac diagnostics
 - pulmonary diagnostics
 - referral for specialty consult
- m. Demonstrate the knowledge to request required pre-operative treatment(s) as indicated, such as:
 - aerosol therapy
 - blood product therapy
 - pre-medication
- n. Describe patient education, in terms of:
 - advance directives
 - preoperative instructions
 - post anesthesia care
 - discharge process
- o. Describe obtaining informed consent:
 - verify identity and procedure
 - provide anesthetic options
 - identify risks and complications
 - verify patient understanding
- p. Identify and explain preoperative procedures required based on assessment findings and surgical procedures, such as:
 - preparing special equipment
 - securing the chart
 - securing x-rays

E. Manage the patient's airway

Performance indicators

1. Perform airway assessments
2. Prepare equipment for all airway management techniques
3. Perform airway management
4. Perform under direct supervision of the anesthesiologist the following procedures:
 - bag/mask ventilation
 - insertion of oropharyngeal/nasopharyngeal airway
 - endotracheal/nasotracheal intubation
 - laryngeal mask airway insertion
5. Perform the Sellick technique
6. Assist/perform difficult airway management under direct supervision of the anesthesiologist:
 - awake intubation
 - double lumen endotracheal tube insertion
 - rapid sequence induction

Foundational Knowledge

- a. Describe the components of an airway assessment including:
 - anesthetic history
 - Mallampati classification
 - physical assessment of the airway
 - other anatomical characteristics affecting the airway
- b. Describe the techniques used to maintain or secure a patient's airway:
 - chin lift/jaw thrust
 - supraglottic airway device insertion
 - bag/mask ventilation
 - endotracheal intubation
- c. Describe and compare devices used for airway management including:
 - face masks
 - oropharyngeal airways
 - rigid laryngoscopes
 - laryngoscope blades
 - endotracheal tubes
 - laryngeal mask airways
 - nasal airways

- d. Describe adjunct intubation devices including:
- appropriate equipment specific to client condition, length and type of surgical case:
 - flexible fiberoptic bronchoscope
 - lighted intubation stylet
 - stylets, bougies
 - video laryngoscopes
- e. Describe alternative endotracheal devices including:
- bronchial blockers
 - double lumen tubes
 - single lumen bronchial tubes
- f. Describe management of the difficult airway based on the American Society of Anesthesiologists difficult airway algorithm
- g. Describe techniques used to ensure proper use of airway devices:
- awake intubation
 - choice and preparation of an endotracheal tube
 - cricothyroidotomy
 - endotracheal intubation compared with a laryngeal mask airway for maintaining an airway
 - endotracheal tube insertion
 - placement of a laryngeal mask airway
 - procedure for missed intubation
 - proper use of mask/bag/oral/nasal airway ventilation
 - rapid sequence induction
- h. Discuss airway care and maintenance during the intraoperative period including:
- aspiration of gastric contents
 - bronchospasm
 - complications (i.e. inadvertent bronchial intubation, leak while tube is in place)
 - direct or indirect trauma resulting in upper airway edema or bleeding
 - SpO₂, ETCO₂, expired tidal volume, and airway pressure
 - tracheal tube obstruction
- i. Describe the surgical airway:
- landmarking
 - insertion techniques
- j. Discuss techniques used for the safe removal of airway devices and discontinuance of airway maintenance
- k. Discuss the technique of awake extubation

- l. Discuss immediate and delayed complications of extubation
- m. Identify risks and complications of airway management using:
 - bag/mask ventilation
 - endotracheal tubes
 - double lumen tubes
 - laryngeal mask airways
 - oropharyngeal/nasopharyngeal airways
- n. Discuss associated troubleshooting and corrective actions in situations such as:
 - esophageal intubation
 - inadvertent bronchial intubation
 - malfunctioning tubes

F. Assist with the Administration of General Anesthesia

Performance Indicators

1. Prepare all equipment necessary for the anesthetic
2. Prepare appropriate intravenous administration equipment
3. Demonstrate correct intravenous insertion techniques
4. Evaluate the patient
5. Apply techniques for the induction of anesthesia
6. Position the patient with respect to surgical requirements, patient limitations, airway and the minimizing of pressure points
7. Monitor patient status during anesthesia and at emergence
8. Recognize complications and take corrective action
9. Recognize a patient emergency and assist with managing the critical event
10. Practice maintenance of general anesthesia
11. Practice discontinuation of anesthesia
12. Transfer patient for post-operative care

Foundational Knowledge

- a. Review the components of the preoperative assessment
- b. Review the components of the perioperative assessment
- c. Review the components of the post-operative assessment
- d. Describe important considerations of positioning
- e. Describe considerations of special positions
- f. Detail complications of positioning
- g. Describe protective measures to minimize complications of positioning
- h. Describe relevant guidelines (e.g. Enhanced Recovery After Surgery)
- i. Describe clean, aseptic and sterile techniques
- j. Describe inhalation induction
- k. Describe intravenous induction
- l. Detail monitoring of physiological parameters to maintain and/or evaluate depth of anesthesia

- m. Describe the evaluation of depth of anesthesia
- n. Detail the adjustment of medications to maintain anesthesia
- o. Review the maintenance of the patient airway during general anesthesia
- p. Explain discontinuance of anesthetic agents
- q. Detail transfer of the patient to the post-operative area
- r. Demonstrate skills used in the emergence of anesthesia in a simulated setting
- s. Describe how the anesthetic care plan should be modified for patients with special considerations, including:
 - cardiovascular compromise
 - elderly patients
 - endocrine issues
 - hepatic compromise
 - neurological compromise
 - neuromuscular compromise
 - obese patients
 - patients with thermal injury
 - pediatric patients
 - pregnant patients
 - psychiatric compromise
 - renal compromise
 - respiratory compromise
 - septic patients
 - transplant patients
 - trauma patients
- t. Discuss the management and physiology of specific surgical procedures, including:
 - cardiac surgery
 - general surgery
 - ENT surgery
 - neurosurgery
 - obstetrical surgery
 - orthopedic surgery
 - thoracic surgery
 - vascular surgery
- u. Practice skills associated with management of patients mentioned above
- v. Assist with anesthesia management of patients mentioned above in a simulated setting

G. Delivery of Regional Anesthesia

Performance Indicators

1. Position patient properly for regional procedure
2. Demonstrate the administration of prescribed local anesthetic
3. Assist in the administration of epidural anesthesia
4. Assist in the administration of spinal anesthesia
5. Assist in the administration of peripheral nerve block, including utilizing appropriate equipment (E.g. ultrasound)
6. Recognize complications and take appropriate corrective action

Foundational Knowledge

- a. Detail the anatomy relevant to the placement of neuraxial and peripheral nerve blocks including the appropriate landmarks involved
- b. Explain the indications and contraindications of an epidural anesthetic
- c. Detail the physiological effects of an epidural anesthetic
- d. Detail the technique for administering an epidural anesthetic
- e. Review how drug type, dose and volumes impact the onset, duration, and intensity of anesthetic and explain expected dosages of medications
- f. Discuss treatment for complications
- g. Describe epidural needles
- h. Describe methods of evaluating effectiveness of epidural anesthesia
- i. Compare spinal and epidural anesthesia
- j. Detail the physiological effects of a spinal anesthetic
- k. Detail the technique for administering a spinal anesthetic
- l. Describe how to evaluate the effectiveness of a spinal anesthetic
- m. Discuss treatment for complications of a spinal anesthetic
- n. Describe equipment required for a spinal anesthetic
- o. Describe spinal needles

- p. Compare spinal and epidural anesthesia in terms of factors which influence the distribution of local anesthetic
- q. Describe how drug type and vasoconstrictor affect the duration of anesthetic
- r. Review how drug type, dose and volumes impact the onset, duration, and intensity of anesthetic and explain expected dosages of medications
- s. Explain the use of nerve stimulation for monitoring and establishment of regional anesthesia
- t. Review indications and contraindications for peripheral nerve blocks
- u. Describe conditions where peripheral nerve blocks are used
- v. Describe use of continuous blocks
- w. Describe drug dosages for peripheral nerve blocks
- x. Describe the administration of peripheral nerve blocks
- y. Describe the physiologic effects of peripheral nerve blocks in terms of:
 - dosage
 - duration
 - mechanism of action
 - side effects
- z. Describe how types of drugs and addition of a vasoconstrictor affects duration of anesthesia
- aa. Describe complications of peripheral nerve blocks including:
 - failure of block
 - local anesthetic toxicity
 - Horner's syndrome
- bb. Compare equipment used in peripheral nerve blocks to that used in the administration of other types of anesthesia administration
- cc. Discuss the equipment used for peripheral nerve blocks including:
 - nerve simulator
 - stimulating versus non-stimulating needles/catheters
 - ultrasound

H. Deliver Procedural Sedation

Performance Indicators

1. Perform pre-operative assessment and discuss with attending physician or as per protocol
2. Apply monitors for procedural sedation addressing the needs of specific procedures
3. Administer procedural sedation

Foundational Knowledge

- a. Review indications and contraindications for procedural sedation including:
 - airway access
 - airway assessment
 - appropriate dosing
 - co-morbidities
- b. Describe pre-op assessment for procedural sedation
- c. Discuss monitoring requirements for procedural sedation
- d. Compare equipment used in procedural sedation to other forms of anesthesia administration
- e. Discuss classes of pharmacological agents used in procedural sedation
- f. Describe drug dosages for procedural sedation
- g. Discuss reversal agents for procedural sedation with regards to dosage and complications of reversal agents
- h. Discuss complications related to procedural sedation
- i. Detail types of procedural sedation
- j. Detail procedural sedation technique

I. Manage Post Anesthesia Care

Performance Indicators

1. Assess the patient in the recovery room
2. Recognize post-operative complications and take corrective action

Foundational Knowledge

- a. Describe the recovery phase of anesthesia
- b. Describe appropriate assessment of a patient in recovery
- c. Describe and suggest management for common post-operative problems, including:
 - agitation
 - airway obstruction
 - bleeding abnormalities
 - cardiac arrhythmias/ischemia
 - congestive heart failure
 - decreased level of consciousness
 - hypoxemia
 - hypotension
 - hypothermia
 - hypoventilation
 - hypertension
 - nausea and vomiting
 - pain
 - post-operative delirium
 - post-operative glucose control
 - renal dysfunction
- d. Understand discharge criteria from post anesthesia care unit

J. Assist with pain management

Performance Indicators

1. Assess the patient's postoperative pain
2. In consultation with the anesthesiologist, formulate a multimodal approach to the treatment of a postoperative patient
3. Recognize complications that are associated with postoperative pain management and in consultation with the anesthesiologist, prepare a plan of corrective actions
4. Recognize the requirements for the safe administration of intravenous narcotics
5. Recognize the side effects associated with neuraxial analgesia and perform corrective actions if necessary

Foundational Knowledge

- a. Discuss the goals of pain management appropriate to the patient needs:
 - evaluation and treatment of postoperative pain
 - identification and management of undesirable side effects related to postoperative analgesic techniques
- b. Compare and contrast commonly used pain rating scales such as:
 - descriptive indicators
 - numerical
 - visual analog scale
- c. Discuss challenges in assessing pain in pediatric and geriatric patients and in patients with an intellectual disability
- d. Discuss adverse physiological effects of pain that may result in multi system organ involvement including:
 - catecholamine release resulting in tachycardia and bradycardia
 - limited ambulation resulting in deep venous thrombosis
 - stress induced hypercoagulable state
- e. Discuss the neural physiology of pain in terms of:
 - endogenous mediators of inflammation
 - nociception
 - pain modulated neural transmitters

- f. Discuss analgesic drug delivery routes and systems:
 - epidural pumps
 - intramuscular
 - intravenous
 - oral
 - patient-controlled analgesia
- g. List the proposed risks and benefits of multimodal analgesia
- h. Discuss indications/contraindications for combined procedures such as:
 - neuraxial analgesia with intravenous anesthesia
- i. Detail the role of the anesthesiologist in the management of pain
- j. Detail the determinations of the appropriate method of analgesia delivery given oral, intramuscular, intravenous and patient-controlled anesthesia routes
- k. Compare neuraxial analgesia with intravenous and other types of regional anesthesia
- l. Describe chronic pain
- m. Discuss the indications for peripheral nerve block use

K. Perform Crisis Management

Performance Indicators

1. Recognize a critical event and initiate appropriate supportive and corrective action
2. Monitor patient to assess efficacy of interventions and revise treatment plans as appropriate

Foundational Knowledge

- a. Describe the factors that can precipitate a critical event such as:
 - human error
 - system error
- b. Discuss how to reduce the risk of such events occurring
- c. Define the criteria which may indicate that a critical event is imminent
- d. Determine an appropriate differential diagnosis for the following categories of critical events:
 - cardiovascular
 - respiratory
 - metabolic
 - neurologic
 - equipment malfunction

with reference to the following patient groups:

- adult
 - geriatric
 - pediatric
 - neonatal
 - obstetric
- e. Describe the appropriate supportive and corrective actions to be taken in the above situations
 - f. Explain how to continually assess the efficacy of such interventions

L. Administer blood products

Performance Indicators

1. Cross-check blood products
2. Prepare equipment for the administration of blood products
3. Assist with cell salvage
4. Perform massive transfusion

Foundational Knowledge

- a. Classify body fluids by compartment, age, gender and body morphology
- b. Compare fluid therapy without blood loss using colloids and crystalloids
- c. Explain the indications and contraindications for the administration of:
 - blood products (including blood transfusion)
 - fluid therapy (colloids and crystalloids)
- d. Recognize risks associated with the administration of blood products and fluid therapy and explain methods to mitigate these risks.
- e. Calculate maintenance fluid requirements
- f. Compare autologous and allogeneic forms of blood therapy
- g. Compare blood products in terms of composition, benefits and administration
- h. Detail the physiological effects of receiving blood products
- i. Detail the technique for administering blood products
- j. Detail lab and point of use testing for blood product administration
- k. Describe the equipment used when administering blood products in terms of:
 - components
 - proper usage
 - trouble shooting
 - preventative maintenance
- l. Describe patient preparation for the administration of blood products
- m. Describe patient monitoring required when blood products are administered
- n. Explain the importance of acid base balance
- o. Compare systems and methods for maintaining acid base balance

- p. Discuss perioperative fluid management:
- calculation of perioperative fluid requirements
 - risk factors for significant fluid deficits
 - fluid replacement options
 - determination of the adequacy of fluid therapy
 - potential consequences of administering insufficient/excess fluid
 - electrolyte imbalance, including normal values and the potential consequences and treatment of abnormal electrolyte levels

M. Assist with the Delivery of Anesthesia in Special Circumstances

Performance Indicators

1. Assist the attending anesthesiologist with the delivery of anesthesia to patients with specific conditions
2. Assist the attending anesthesiologist with the delivery of anesthesia in satellite sites

Foundational Knowledge

- a. Describe anesthetic considerations for the following specific patient subsets, such as:
 - bariatric
 - cardiac disease
 - chronic pulmonary disease
 - endocrine disease
 - geriatric
 - hepatic dysfunction
 - neonatal
 - neurological disease
 - obstetric
 - pediatric
 - renal dysfunction
 - sepsis
 - transplant
 - trauma
- b. Describe considerations for providing anesthesia in satellite (external to the operating suites) sites, including the following locations:
 - computed tomography suite
 - electroshock therapy suite
 - endoscopy
 - interventional radiology
 - magnetic resonance imaging suite

APPENDIX A : BLOOM'S TAXONOMY

Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
<p><i>Definition: Remembers previously learned material.</i></p> <ul style="list-style-type: none"> • cite • define • describe • numerate • identify • indicate • label • list • locate • match • name • outline • point • recall • recognize • reproduce • select • state • tabulate • write 	<p><i>Definition: Grasps the meaning of material (lowest level of understanding)</i></p> <ul style="list-style-type: none"> • approximate • articulate • associate • characterize • clarify • contrast • convert • differentiate • delineate • describe • discuss • explain • give example • locate • paraphrase • predict • review • summarize • translate 	<p><i>Definition: Uses learning in a new and concrete situation (higher level understanding).</i></p> <ul style="list-style-type: none"> • ascertain • adapt • apply • assign • calculate • complete • compute • conduct • construct • contract • demonstrate • determine • discover • establish • estimate • employ • explore • expose • factor • illustrate • investigate • make • manipulate • maintain • modify • orient • perform • practice • predict • prepare • produce 	<p><i>Definition: Understands both the content and structure of material.</i></p> <ul style="list-style-type: none"> • analyze • break down • categorize • classify • compare • contrast • correlate • deduce • detect • differentiate • discriminate • examine • figure out • group • manage • maximize • minimize • optimize • order • outline • select • separate • train • transform 	<p><i>Definition: Formulates new structures from existing knowledge and skills.</i></p> <ul style="list-style-type: none"> • arrange • assemble • budget • code • combine • compile • construct • create • cultivate • design • develop • enhance • explain • facilitate • formulate • generalize • generate • improve • integrate • organize • plan • prepare • produce • propose • relate • revise • sequence • specify • write 	<p><i>Definition: Judges the value of material for a given purpose.</i></p> <ul style="list-style-type: none"> • alleviate • assess • communicate • conclude • consider • counsel • criticize • critique • decide • defend • detect • elicit • estimate • evaluate • grade • interpret • judge • justify • measure • predict • prescribe • rank • rate • recommend • reinforce • release • review • select • score • support • test • validate • verify