

American Board of Anesthesiology

Examination for Subspecialty Certification in Anesthesiology Critical Care (Approved January 2003; updated December 2003)

Content Outline Introduction

The Committee on Critical Care Medicine of the American Board of Anesthesiology prepared this document. It is intended as a content outline for the subspecialty certifying examination in critical care medicine. It **provides an overview** of the knowledge a certified anesthesiology critical care medicine specialist should be able to demonstrate on an examination consisting of multiple-choice questions. Its purpose is to provide a general overview of topics that may be encountered during a written examination process for certification. It should be used as a general guide for program directors and candidates, but several caveats are important to note:

- 1) **THIS DOCUMENT IS NOT** intended to be a curriculum guide. There are many skills that intensivists need to learn that cannot be tested in a multiple-choice examination. Also, there are many areas of knowledge that are not likely to be tested given the time constraints of a written examination.
- 2) **THIS DOCUMENT IS NOT** designed to be a study guide; however, program directors and candidates may choose to use this document to identify areas in which they may benefit from additional education and review.
- 3) **THIS DOCUMENT IS** intended only as a potential blueprint, it has not been edited for publication and it remains a work in-progress.

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CONTENT OUTLINE

01. Basic pathophysiology as it pertains to critical illness

- A. Shock states
 - 01. Hypovolemic
 - 02. Cardiogenic
 - 03. Neurogenic/spinal
 - 04. Septic
 - 05. Anaphylactic/anaphylactoid
- B. Cardiac
 - 01. Hypoxia/ischemia
 - 02. Acid-base imbalance
 - 03. Systolic/diastolic dysfunction
 - 04. Systemic oxygen supply and demand
 - 05. Mechanisms of transcapillary fluid flux
 - 06. CHF, pulmonary edema
 - 07. Cardiac arrest/resuscitation
 - 08. Hypertension
 - 09. Pulmonary hypertension
 - 10. Other
- C. Pulmonary
 - 01. Pulmonary mechanics
 - a. Control of breathing
 - b. Work of breathing
 - c. Gas exchange
 - d. Weaning
 - e. Other
 - 02. Respiratory failure
 - a. Acute
 - b. Acute respiratory distress syndrome
 - c. Hypoxic
 - d. Hypercapnic
 - 03. DVT/thromboembolic disease
- D. Renal
 - 01. Acid-base status
 - 02. Electrolyte abnormalities
 - 03. Osmolarity
- E. Regional blood flow factors
 - 01. Autoregulation
 - 02. Neural regulation
 - 03. Humoral influences
- F. Systemic inflammatory response/PIROS
- G. Sepsis and life threatening infection
- H. Multiple organ dysfunction syndrome

- I. Thermoregulation
 - 01. Hypothermia
 - 02. Fever/hyperthermia
 - a. Fever
 - b. Malignant hyperthermia
 - c. Neuroleptic malignant syndrome
 - 03. Heat stroke

02. Critical care pharmacology – indications, contraindications, and uses

- A. Pharmacokinetics and pharmacodynamics
- B. Vasoactive or modulating drugs
 - 01. Inotropes/chronotropes/lusitropes
 - 02. Vasodilators
 - 03. Vasoconstrictors
 - 04. Antihypertensives
 - 05. Antidysrhythmics
 - a. Rhythm
 - b. Rate
- C. Cholinergic antagonists
- D. Pulmonary medications
 - 01. Inhaled
 - 02. Systemic
- E. Sedative, analgesic, and neuromuscular blocking drugs
- F. Antimicrobials
 - 01. Antibiotics
 - a. Gram-positive organisms
 - b. Gram-negative organisms
 - c. Anaerobes
 - d. TB
 - e. Spirochetal and rickettsial
 - f. Other
 - 02. Antifungal
 - 03. Antiviral
 - 04. Antiparasitic
 - 05. Antimicrobial resistance
- G. Anticoagulants and antithrombotics
 - 01. Heparin
 - a. Unfractionated
 - b. LMWH
 - c. Heparinoids
 - 02. Coumadin
 - 03. Antiplatelet agents
 - 04. Thrombin inhibitors (eg, lepirudin, argatrobin)
 - 05. Activated protein C
 - 06. Thrombolytics
 - 07. Other
- H. Drugs affecting the GI tract
 - 01. Acid suppression
 - 02. Motility
 - 03. Ulcer medications
 - 04. GI blood flow modulators
 - 05. Other
- I. Hormones
 - 01. Insulins
 - 02. Oral hypoglycemics
 - 03. Steroids – glucocorticoid and mineralocorticoid
 - a. Physiologic
 - b. Pharmacologic

- 04. Vasopressin/DDAVP
 - a. Physiologic
 - b. Pharmacologic
- 05. Thyroid hormone
- 06. EPO, GCSF
- J. CNS medications
 - 01. Anticonvulsants
 - 02. Neuroprotectants
 - 03. ICP-controlling medications
- K. Immune-suppressing medications
- L. Renal
 - 01. Diuretics
 - 02. Buffers
 - 03. Other

03. Organ specific pathology – diagnosis, management and natural history

- A. Central nervous system and psychiatric
 - 01. Closed head injury
 - 02. Spinal cord injury
 - 03. Subarachnoid hemorrhage, AV malformation, intracerebral aneurysms
 - 04. Stroke
 - a. Embolic/thrombotic
 - b. Hemorrhagic
 - 05. Infectious
 - a. Meningitis
 - b. Encephalitis
 - c. Abscess
 - 06. Neuromuscular disorders
 - a. Demyelinating
 - b. Guillain-Barre
 - c. Myasthenia gravis
 - d. Peripheral neuropathy
 - e. Critical illness polyneuropathy
 - f. Myopathy
 - 01. congenital
 - 02. acquired
 - a. drug
 - b. toxin
 - c. rhabdomyolysis
 - g. Other
 - 07. Altered mental status
 - a. Metabolic abnormalities
 - b. Anoxia
 - c. Delirium
 - d. Coma/altered level of consciousness
 - e. Other
 - 08. Brain death/herniation
 - 09. Seizures and status epilepticus
 - 10. Degenerative disease of the brain
 - 11. Congenital disease of the CNS in adult
 - 12. Depression
- B. Cardiovascular
 - 01. Coronary artery disease
 - a. Myocardial ischemia/infarction
 - b. Acute coronary syndrome
 - c. Other
 - 02. Peripheral vascular disease
 - a. Aneurysms
 - b. Dissections
 - c. Other
 - 03. Rhythm disturbances
 - a. Disorders of impulse formation
 - b. Disorders of impulse conduction
 - c. Specific disorders of impulse formation, conduction
 - 01. Supraventricular tachycardia
 - 02. Atrial flutter/fibrillation

- 03. Junctional or nodal
- 04. Ventricular tachycardia/fibrillation
- 05. Heart block
- 06. Asystole
- 07. Other conduction abnormalities (eg, WPW)
- 04. Structural
 - a. Valvular
 - 01. Aortic
 - a. AS
 - b. AI
 - c. HOCM (ASH or IHSS)
 - 02. Mitral
 - a. MS
 - b. MR
 - 03. Pulmonic
 - 04. Tricuspid
 - b. Pericardial
 - 01. Pericarditis
 - 02. Pericardial effusion
 - 03. Tamponade
 - c. Myocardial
 - 01. Cardiomyopathy
 - 02. Myocarditis
 - 03. Stunned myocardium
 - 04. Papillary muscle dysfunction
- 05. Infectious
 - a. Pericarditis
 - b. Myocarditis
 - c. Endocarditis
- 06. Pulmonary edema
 - a. Cardiogenic
 - b. Noncardiogenic
- 07. Traumatic
 - a. Cardiac contusion
 - b. Valve compromise
 - c. Other
- 08. Cardiac transplantation
 - a. Preoperative preparation and care
 - b. Postoperative management
- 09. Congenital heart disease in adults
 - a. Eisenmenger's
 - b. Tetralogy of Fallot
 - c. Other
- C. Pulmonary
 - 01. Reactive airways disease
 - 02. Obstructive airways disease
 - 03. Restrictive airways disease
 - 04. Aspiration
 - a. Chemical
 - b. Particulate
 - c. Infectious

- 05. Infection
 - a. Pneumonia
 - b. Tracheobronchitis
 - c. Nosocomial pneumonia
 - d. Ventilator-associated pneumonia
- 06. Thromboembolic diseases
- 07. Inflammatory and autoimmune diseases
- 08. ARDS
- 09. Lung transplantation
 - a. Preoperative preparation and care
 - b. Post operative management
- 10. Pulmonary contusion
- 11. Flail chest
- 12. Other
- D. Gastrointestinal
 - 01. GI hemorrhage
 - a. Upper
 - b. Lower
 - 02. GI motility dysfunction
 - a. Malabsorption
 - b. Diarrhea, nausea, vomiting
 - c. Ileus
 - d. Toxic megacolon
 - e. Other
 - 03. Bowel perforation
 - 04. Inflammatory bowel diseases
 - 05. Vascular diseases of the bowel
 - 06. Pseudomembranous colitis
 - 07. Infectious
 - 08. Pancreatitis
 - 10. Abdominal compartment syndrome
- E. Hepatic
 - 01. Hepatitis
 - 02. Hepatic dysfunction
 - 03. Hepatic failure
 - a. Fulminant
 - b. Subacute
 - c. Chronic
 - 04. Hepatic encephalopathy
 - 05. Hepatorenal syndrome
 - 06. Liver transplantation
 - a. Preoperative preparation and care
 - b. Postoperative management
- F. Renal
 - 01. Pre-renal
 - 02. Intrinsic renal
 - a. Glomerular defects
 - b. Tubular abnormalities
 - c. Other
 - 03. Post-renal

- 04. Renal hemorrhage
- 05. Infectious
 - a. UTI
 - b. Pyelonephritis
 - c. Perinephric abscess
- 06. Renal, renal/pancreas transplantation
 - a. Preoperative preparation and care
 - b. Postoperative management
- G. Hematologic/oncologic
 - 01. Anemia
 - a. Low production
 - b. Destruction
 - c. Hemolysis
 - d. Blood loss
 - 02. Abnormal white cell number or function
 - 03. Abnormal platelet count or function
 - a. Thrombocytosis
 - b. Thrombocytopenia
 - 01. Dilutional
 - 02. Sequestration
 - 03. Destruction
 - 04. Immune
 - c. Thrombocytopathy
 - 04. Coagulopathy
 - a. Congenital
 - b. Acquired
 - 01. Vitamin K dependent
 - 02. DIC
 - 03. Isolated factor
 - a. Antibody
 - b. Other
 - 05. Fibrinolysis
 - a. Primary
 - b. Secondary
 - 06. Hemoglobinopathies
 - 07. Microangiopathies
 - 08. Bone marrow transplantation
 - 09. Tumor lysis syndrome
 - 10. Other
- H. Dermatologic
 - 01. Disruption of the skin barrier
 - 02. Inflammatory diseases of the skin
 - 03. Allergic reactions
 - 04. Infection
 - a. Cellulitis
 - b. Necrotizing fasciitis
 - c. Other
- I. Immune
 - 01. Immune suppression
 - a. Congenital
 - b. Acquired
 - 01. HIV/AIDS/HAART

- 02. Drug
- 03. Disease
- 02. Autoimmune
 - a. SLE
 - b. RA
 - c. Mixed connective tissue disease
 - d. Vasculitides
 - e. Other
- J. Endocrine
 - 01. Diabetes mellitus
 - a. Hyperglycemia
 - b. Hypoglycemia
 - c. DKA
 - d. NKHC
 - 02. Thyroid disease
 - a. Hypothyroid and myxedema
 - b. Hyperthyroid and thyroid storm
 - c. Euthyroid sick
 - 03. Adrenal
 - a. Relative deficiency
 - b. Absolute deficiency
 - c. Pheochromocytoma
 - 04. Pituitary
 - a. SIADH
 - b. DI
 - c. Cerebral salt wasting
 - 05. Other (eg, carcinoid)
- K. Obstetric
 - 01. Serious complications of pregnancy
 - a. Eclampsia
 - b. Hemorrhage
 - c. Acute fatty liver
 - d. HELLP
 - e. Amniotic fluid embolus
 - f. Aspiration/respiratory failure
 - g. Associated cardiopulmonary disease
 - i. Other

04. Life support measures

- A. Cardiac
 - 01. IABP
 - 02. ECMO
 - 03. LVADs, RVADs
- B. Pulmonary
 - 01. Noninvasive ventilation
 - a. CPAP
 - b. BiPAP
 - 02. Invasive ventilation
 - a. Assist control
 - b. SIMV
 - c. PC/volume control
 - d. High-frequency/oscillation
 - e. Prone ventilation
 - f. Pressure-support ventilation
 - g. CPAP
 - h. Airway pressure-release ventilation
 - i. Complications
 - j. Other
- C. Renal
 - 01. Renal replacement therapies
 - a. CWH and CVVHD
 - b. CAVH and CAVHD
 - c. SCUF
 - 02. Intermittent hemodialysis
 - 03. Peritoneal dialysis
- D. Plasmaphoresis/plasma exchange
- E. Metabolic or nutritional states
 - 01. Basal and stress energy requirements
 - 02. Stress hormone response
 - 03. Excess support
 - 04. Deficiency states
 - 05. Feeding
 - a. Risk:benefit
 - b. Enteral
 - c. Parenteral
 - 06. Refeeding syndrome

05. Fluid, electrolyte and transfusion therapy – indications, contraindications, risk:benefit

- A. Fluids
 - 01. Crystalloid
 - 02. Colloids
- B. Electrolytes
 - 01. Sodium
 - a. Hyponatremia
 - b. Hypernatremia
 - 02. Potassium
 - a. Hypokalemia
 - b. Hyperkalemia
 - 03. Calcium
 - a. Hypocalcemia
 - b. Hypercalcemia
 - 04. Magnesium
 - a. Hypomagnesemia
 - b. Hypermagnesemia
 - 05. Phosphorus
 - a. Hypophosphatemia
 - b. Hyperphosphatemia
 - 06. Chloride
 - a. Hypochloremia
 - b. Hyperchloremia
 - 07. Other
- C. Transfusion therapy
 - 01. Red cells
 - 02. Platelets
 - 03. Coagulation factors
 - a. FFP
 - b. Cryoprecipitate
 - c. Other
 - 04. Complications

06. Specialized Areas

- A. Trauma management
 - 01. Fluid resuscitation
 - 02. Transfusion therapy
 - 03. Complications
 - 04. ATLS
 - 05. Other
- B. Burns
 - 01. Smoke inhalation
 - 02. Fluid management
 - 03. Infection risk
 - 04. Electrical burns
 - 05. Therapy
 - 06. Complications
- C. ACLS guidelines
- D. Poisonings, toxic ingestions, overdoses
- E. Biologic, chemical, and nuclear exposures
- F. Near-drowning/drowning
- G. Procedures – indications, contraindications, complications, and applications
 - 01. Airway
 - a. Transtracheal tubes
 - b. Tracheostomy
 - c. LMA/others
 - 02. Bronchoscopy
 - 03. Chest tubes
 - 04. Pacemakers/defibrillators
 - a. Implanted
 - b. Transthoracic
 - c. Transvenous
 - d. Percutaneous
 - e. AICDs
 - f. External defibrillators
 - 05. Paracentesis
 - 06. Thoracentesis
 - 07. Pericardiocentesis
 - 08. General nutritional
 - a. Enteral tubes
 - b. Other
 - 09. ICU transport

- H. Medical imaging
 - 01. Routine radiography
 - 02. Ultrasonography/Doppler
 - a. Transcranial Doppler
 - b. TTE
 - c. TEE
 - d. Other
 - 03. CT/MRI
 - 04. Interventional imaging
- I. ICU technology
 - 01. Monitoring
 - a. Neurologic
 - 01. EEG/evoked potentials
 - 02. ICP
 - 03. Neuromuscular
 - 04. Other
 - b. Cardiac
 - 01. ECG
 - 02. Arterial pressure
 - 03. CVP/PAC
 - 04. Cardiac output monitoring
 - 05. Other
 - c. Pulmonary
 - d. Renal
 - e. Nutrition/metabolic
 - 01. Indirect calorimetry
 - 02. Nutritional state analysis
- J. Biostatistics
 - 01. P-value
 - 02. T-test
 - 03. ANOVA
 - 04. Sample-size estimate
 - 05. Type 1 and 2 error
 - 06. ROC
- K. Infection control
 - 01. Isolation techniques
 - a. General/universal precautions
 - b. Specific isolation procedures
 - c. Reverse isolation
 - 02. Preparation techniques
 - 03. Environmental exposures
 - 04. Needle stick injuries
 - 05. Nosocomial infections
 - a. UTI
 - b. Pneumonia
 - c. Ventilator-associated pneumonia
 - d. Catheter sepsis
 - e. Other
- L. ICU management and organization
 - 01. QA/QI
 - 02. Compliance
 - 03. HIPAA

- 04. Scoring systems
- 05. Regulatory requirements
- M. ICU ethics
 - 01. End-of-life
 - 02. Palliative care
 - 03. Informed consent
 - 04. Living will/DPOA
 - 05. Next of kin – proxy decision makers, medical representatives
 - 06. Patient care and the legal system
 - 07. Brain death
 - 08. Organ donation
 - 09. Impaired providers