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