Critical Care Medicine Blueprint

Certification Examination (CERT)

Purpose of the exam

The exam is designed to evaluate the knowledge, diagnostic reasoning, and clinical judgment skills expected of the certified critical care medicine specialist in the broad domain of the discipline. The ability to make appropriate diagnostic and management decisions that have important consequences for patients will be assessed. The exam may require recognition of common as well as rare clinical problems for which patients may consult a certified critical care medicine specialist.

Exam content

Exam content is determined by a pre-established blueprint, or table of specifications. The blueprint is developed by the ABIM and is reviewed annually and updated as needed for currency. Trainees, training program directors, and certified practitioners in the discipline are surveyed periodically to provide feedback and inform the blueprinting process.

The primary medical content categories of the blueprint are shown below, with the percentage assigned to each for a typical exam:

Medical Content Category	% of Exam
Renal, Endocrine, and Metabolic Disorders	15.0%
Cardiovascular Disorders	17.5%
Pulmonary Disease	20.0%
Infectious Disease	12.0%
Gastrointestinal Disorders	5.0%
Neurologic Disorders	9.5%
Hematologic and Oncologic Disorders	5.5%
Surgery, Trauma, and Transplantation	7.0%
Pharmacology and Toxicology	4.5%
Research, Administration, and Ethics	2.0%
Critical Care Ultrasound Scanning	2.0%
	100%

Exam questions in the content areas above may also address clinical topics in general internal medicine that are relevant to the practice of critical care medicine (including some general pediatrics with an emphasis on adolescent medicine).

ABIM is committed to working toward health equity and believes that board-certified physicians should have an understanding of health care disparities. Therefore, health equity content that is clinically important to each discipline will be included in assessments, and the use of gender, race, and ethnicity identifiers will be re-evaluated.

Exam format

The exam is composed of up to 240 single-best-answer multiple-choice questions, of which approximately 40 are new questions that do not count in the examinee's score. Most questions describe patient scenarios and ask about the work done (that is, tasks performed) by physicians in the course of practice:

- Making a diagnosis
- Ordering and interpreting results of tests
- Recommending treatment or other patient care
- Assessing risk, determining prognosis, and applying principles from epidemiologic studies
- Understanding the underlying pathophysiology of disease and basic science knowledge applicable to patient care

Clinical information presented may include various media illustrating relevant findings, such as diagnostic imaging studies. Some questions require interpretation of pictorial material, such as pressure tracings, ultrasound scans, magnetic resonance imaging scans, electrocardiograms, radiographs, computed tomograms, radionuclide scans, and photomicrographs. Learn more information on how exams are developed.

A tutorial including examples of ABIM exam question format can be found at http://www.abim.org/certification/exam-information/critical-care-medicine/exam-tutorial.aspx.

The blueprint can be expanded for additional detail as shown below. Each of the medical content categories is listed there, and below each major category are the content subsections and specific topics that *may* appear in the exam. Please note: actual exam content may vary.

Renal, Endocrine, and Metabolic Disorders	**15%** of Exam
Sodium-water balance	2%
Hyponatremia	
Syndrome of inappropriate antidiuretic hormone secretion	
Cerebral salt wasting	
Psychogenic polydipsia	
Hypothyroidism	
Iatrogenic	
Exercise-induced	
Hypernatremia	
Central diabetes insipidus	
Nephrogenic diabetes insipidus	
Osmotic diuresis	
Primary hypodipsia	
Dehydration	
Gastrointestinal fluid losses	
Hypervolemia	
Hypovolemia	
Potassium disorders	<2%
Hyperkalemia	
Pseudohyperkalemia	
Drug-induced	
Adrenal insufficiency	
Hypokalemia	
Vomiting	
Diarrhea	
Renal losses	
Drug-induced	
Acid-base disorders	4.5%
Metabolic acidosis	
Increased anion gap	
Lactic acidosis	
Ketoacidosis	
Hypoalbuminemia	
Normal anion gap	
Diarrhea	
Saline resuscitation-associated	
Drug-induced	
Decreased anion gap in multiple myeloma	

Metabolic alkalosis	
Diuretic-induced (contraction alkalosis)	
Other metabolic alkalosis topics (parenteral	
…nutrition–induced, complications of citrate anticoagulation)	
Mixed acid-base disorders	
Respiratory acidosis	
Respiratory alkalosis	
Toxic ingestions	<2%
High osmolar gap	
Ethanol	
Methanol	
Isopropyl alcohol	
Ethylene glycol	
Propylene glycol	
Normal osmolar gap	
Salicylates	
Calcium, phosphate, and magnesium disorders	<2%
Hyperphosphatemia	
Hypophosphatemia	
Hypercalcemia	
Hypocalcemia	
Hypermagnesemia	
Hypomagnesemia	
Hyperammonemia	<2%
Diabetes mellitus (excluding diabetic ketoacidosis) and energy metabolism	<2%
Hyperglycemic hyperosmolar state	
Hyperglycemia	
Hypoglycemia	
Thyroid disorders	<2%
Hypothyroidism	
Hyperthyroidism	
Nonthyroidal illness syndrome	
Parathyroid disorders	<2%
Adrenal disorders	<2%
Adrenal insufficiency	
Relative adrenal insufficiency in critical illness	
Adrenal excess	
Addison Disease	

Pituitary disorders <2%

Tumor-related syndromes <2%

Acute kidney injury 2%

- Contrast-induced
- Pigment-induced
- Oncology-related
- Pre-renal disease
- Intrinsic disease
  - Glomerulonephritis
  - Interstitial nephritis
  - Rhabdomyolysis
  - Acute tubular necrosis
- Renal replacement therapy

Cardiovascular Disorders — **17.5%** of Exam

Acute coronary syndromes <2%

- Unstable angina pectoris and non-ST-segment elevation myocardial infarction (NSTEMI)
  - Unstable angina pectoris
  - NSTEMI
- ST-segment elevation myocardial infarction (STEMI)
  - Diagnosis
  - Complications
    - Heart failure, cardiogenic shock
    - Ventricular septal defect
    - Acute mitral regurgitation
    - Ventricular wall rupture
    - Electrical conduction abnormalities
    - Right ventricular failure
    - Arrhythmias
  - Management of STEMI
- Cocaine-related ischemia

Arrhythmias <2%

- Supraventricular tachycardia
  - Atrial fibrillation
  - Atrial flutter
  - Multifocal atrial tachycardia
  - Pre-excitation syndromes

Paroxysmal supraventricular tachycardia (atrioventricular [AV] nodal reentrant tachycardia)	
Ventricular arrhythmias	
Nonsustained ventricular tachycardia	
Monomorphic ventricular tachycardia	
Polymorphic ventricular tachycardia	
Ventricular fibrillation	
Accelerated idioventricular rhythm	
Long QT syndrome	
Brugada syndrome	
Bradyarrhythmias	
Sinus bradycardia	
Sinoatrial exit block	
Atrioventricular block	
Pacemakers and defibrillators	
Heart failure	3.5%
Heart failure with reduced ejection fraction (HFrEF)	
Heart failure with preserved ejection fraction (HFpEF)	
Hemodynamic monitoring	5.5%
Interpretation of arterial catheterization	
Pulmonary arterial catheterization	
Central venous catheterization	
Non-invasive hemodynamic monitoring	
Vascular disorders	<2%
Aortic dissection and aneurysm	
Aortic dissection	
Aortic aneurysm and transection	
Shock	
Hypertensive emergency and urgency	
Valvular heart disease	<2%
Mitral stenosis	
Aortic stenosis	
Aortic regurgitation	
Mitral regurgitation	
Endocarditis	
Structural defects	
Atrial	
Ventricular	

Pericardial disease	<2%
Pericarditis	
Cardiac tamponade	
Myocardial disease	<2%
Myocarditis	
Hypertrophic cardiomyopathy	
Peripartum cardiomyopathy	
Stress cardiomyopathy	
Mechanical circulatory support	<2%
Intraaortic balloon pump (IABP) counterpulsation	
Extracorporeal membrane oxygenation (ECMO)	
Ventricular assist devices (VADs)	
Transplanted heart	<2%

Pulmonary Disease	**20%** of Exam
Respiratory failure	2%
Hypoxemic	
Hypercapnic	
Mechanical ventilation	6%
Initiation and maintenance of mechanical ventilation	
Endotracheal intubation and tracheostomy	
Modes	
Oxygenation	
Ventilation (CO_2)	
Waveforms	
Respiratory system compliance (lung mechanics)	
Complications of mechanical ventilation	
Barotrauma	
Bronchopleural fistula	
Ventilator-induced lung injury	
Dynamic hyperinflation (auto-PEEP)	
Intracardiac shunt	
Complications of endotracheal tubes and tracheostomy	
Liberation from mechanical ventilation	
Noninvasive ventilation	
Airway disease	2%
Upper airway disease	
Upper airway obstruction	
Tracheoesophageal fistula	

- Intubation-related laryngeal edema
- Anaphylactic airway edema and increased negative inspiratory pressure
- Airway control
- Asthma
- Chronic obstructive pulmonary disease (COPD)

Parenchymal lung disease 5%

- Acute respiratory distress syndrome (ARDS)
- Pneumonia
  - Community-acquired pneumonia (CAP)
    - Typical bacterial
    - Atypical bacterial
    - Aspiration
    - Viral
    - Fungal
  - Hospital-acquired pneumonias and immunocompromised hosts
    - Ventilator-associated pneumonia (VAP)
    - Hematogenous pneumonia
    - *Aspergillus* pneumonia
    - Non-*Aspergillus* pneumonia
    - *Pneumocystis jirovecii* pneumonia
    - Viral pneumonia
- Noncardiogenic pulmonary edema
  - Neurogenic
  - Tocolytic
  - Negative-pressure
  - High-altitude
- Interstitial lung disease
- Diffuse alveolar hemorrhage
- Atelectasis

Pulmonary vascular disorders 2%

- Pulmonary thromboembolism
  - Deep venous thrombosis (DVT)
  - Pulmonary embolism (PE)
- Nonthrombotic embolism
  - Air
  - Tumor
  - Septic

- Pulmonary hypertension
- Acute chest syndrome in sickle cell disease
- Pulmonary vasculitis
- Hepatopulmonary syndrome

Hemoptysis <2%

- Massive
- Submassive

Pleural disorders 2%

- Pleural effusion
  - Infectious (empyema)
  - Noninfectious
- Pneumothorax
- Hemothorax

Infectious Disease — **12%** of Exam

Systemic infections <2%

- Sepsis and septic shock
- Bacterial infections (typical and atypical)
  - Tuberculosis
  - Atypical mycobacterial infections
  - Nocardiosis
  - Listeriosis
  - Brucellosis
  - Typhoid fever
  - Tularemia
  - Plague
  - Rickettsial or Rickettsial-like infections
    - Rocky Mountain spotted fever
    - Erlichiosis/Anaplasmosis
  - Spirochetal infections
    - Lyme disease
    - Leptospirosis
- Fungal infections
- Viral infections
- Parasitic diseases
  - Malaria
  - Babesiosis
  - *Strongyloides* hyperinfection syndrome
  - Giardiasis

Central nervous system infections	<2%
Meningitis	
Bacterial	
Meningococcal	
Pneumococcal	
Syphilitic	
Listerial	
Fungal	
Mycobacterial	
Encephalitis	
Viral	
Herpes simplex virus	
West Nile virus	
Rabies	
Parasitic	
Brain abscess	
Epidural abscess	
Head, neck, and upper airway infections	<2%
Eye and orbit	
Septic cavernous sinus thrombosis	
Soft tissue infections of the head and neck	
Sinusitis	
Epiglottitis	
Cardiovascular infections	<2%
Pericarditis	
Endocarditis	
Device-related infections	
Catheter-related infections (peripheral, central venous, arterial, pulmonary artery)	
Gastrointestinal and intra-abdominal infections	<2%
Esophageal	
Liver	
Gallbladder and biliary	
Pancreatitis	
Necrotizing (infected)	
Pancreatic abscess	
Gastroenteritis	
Community-acquired bacterial	

Colitis and diverticulitis	
Clostridioides (Clostridium) difficile–associated	
Parasitic	
Necrotizing enterocolitis (typhlitis)	
Cytomegalovirus colitis	
Peritonitis	
Small intestine and appendix	
Genitourinary tract infections	<2%
Cystitis, including catheter-related	
Pyelonephritis	
Perinephric abscess	
Soft tissue, bone, and joint infections	<2%
Bites	
Septic arthritis	
Infections associated with nonvascular transcutaneous catheters	<2%
Antimicrobial therapy and resistance	<2%
Nonallergic toxicity	
Allergic reactions	
Resistant organisms	
Gram-positive organisms	
Gram-negative organisms	
Fungi and inherent susceptibility patterns and resistance	
Pharmacokinetics	<2%
Infections in immunocompromised hosts	<2%
Opportunistic infections in human immunodeficiency virus (HIV) infection	
Neutropenia	
Transplantation	
Solid organ	
Hematopoietic cell	
Asplenia	
Corticosteroid immunosuppression	
Virulence factors	<2%
Toxic shock	
Bioterrorism	<2%
Hospital infection control	<2%

Gastrointestinal Disorders	**5.0%** of Exam
Esophagus	<2%
Corrosive injury	
Perforation and rupture	
Fistula	
Stomach	<2%
Peptic ulcer disease	
Non-peptic ulcer disease	
Perforation	
Mechanical disorders	
Small intestine	<2%
Perforation	
Hemorrhage	
Mechanical and motility disorders	
Inflammatory bowel diseases	
Large intestine	<2%
Perforation	
Hemorrhage	
Mechanical and motility disorders	
Colonic ischemia	
Liver	<2%
Hepatitis	
Viral	
Autoimmune	
Alcohol- and drug-induced	
Toxin and solvent exposure	
Ischemic (shock liver)	
Budd-Chiari syndrome	
Portal hypertension	
Esophageal variceal hemorrhage	
Gastric variceal hemorrhage	
Spontaneous bacterial peritonitis	
Hepatorenal syndrome	
Hepatopulmonary syndrome	
Portopulmonary hypertension	
Fulminant hepatic failure	
Infection	
Alcohol- and drug-induced	
Tumor	

Infiltrative diseases and nonalcoholic steatohepatitis (NASH)
Toxin exposure
Encephalopathy
Cerebral edema
Hypotension

Pancreas <2%

Pancreatitis
Infectious
Gallbladder disease
Tumor
Alcohol- and drug-induced
Toxin exposure
Hypertriglyceridemia-induced
Complications

Gallbladder and biliary tract <2%

Cholecystitis, calculous and acalculous
Cholangitis

Neurologic Disorders — **9.5%** of Exam

Brain death
(also see entry in Research, Ethics, and Administration) <2%

Cerebrovascular disease 2.5%

Ischemic stroke
Intracerebral hemorrhage
Subarachnoid hemorrhage and aneurysm
Complications
Vasospasm
Other subarachnoid hemorrhage and aneurysm topics (hydrocephalus)
Cerebral vein and sinus thrombosis

Seizures and status epilepticus <2%

Seizures complicating critical illness
Seizures during critical illness
Pre-existing epilepsy in critically ill patients
Status epilepticus
Generalized convulsive status epilepticus
Nonconvulsive status epilepticus

Electroencephalogram (EEG) monitoring in the intensive care unit (ICU)	
Repetitive seizures	
Neurogenic pulmonary edema	<2%
Neuromuscular respiratory failure	<2%
Guillain-Barré syndrome	
Critical illness myopathy	
Critical illness polyneuropathy	
Tetanus	
Myasthenia gravis	
Botulism	
Increased intracranial pressure	<2%
Head trauma	<2%
Nonpenetrating head trauma	
Penetrating head trauma	
Spinal cord injury	<2%
Cervical spine injury	
Thoracic spine injury	
Coma, encephalopathy, and delirium	<2%
Anoxic/hypoxic brain injury	
Metabolic encephalopathy	
Drug-induced encephalopathy	
Drug and alcohol withdrawal	
ICU-related delirium	
Targeted temperature management	
Analgesia, sedation, and neuromuscular junction blockade	2%
Analgesia	
Sedation	
Neuromuscular junction blockade	

Hematologic and Oncologic Disorders	**5.5%** of Exam
Red blood cell diseases	<2%
Anemias	
Polycythemias	
Hemoglobinopathies	
White blood cell diseases	<2%
Leukopenia (immune, drug-related)	
Leukemias	

Lymphoma	
Multiple myeloma	
Platelet disorders	<2%
Thrombocytosis	
Thrombocytopenia	
Platelet dysfunction	
Coagulopathies	<2%
Disseminated intravascular coagulation (DIC)	
Factor deficiencies	
Anticoagulant associated coagulopathy	
Hypothermia	
Hemorrhagic shock	
Hypercoagulable states	<2%
Proteins C and S, and antithrombin deficiency	
Factor V Leiden mutation	
Malignancy	
Hormone replacement therapy and oral contraceptives	
Antiphospholipid antibody syndrome	
Transfusion medicine	<2%
Blood products	
Apheresis	
Adverse effects	
Massive blood transfusion	
Transfusion refusal	
Solid tumors	<2%
Oncologic syndromes	<2%
Superior vena cava syndrome	
Tumor lysis syndrome	
Spinal cord compression	
Hyperviscosity syndrome	
Hypercalcemia	
Hematopoietic cell transplantation	<2%
Graft-versus-host disease	
Hepatic sinusoidal obstruction syndrome (veno-occlusive disease)	
Respiratory distress	
Complications of immunosuppressive drugs and chemotherapy	<2%
Cyclosporine	
Corticosteroids	

Alkylating agents
Methotrexate
Sirolimus
Tacrolimus
Mycophenolate mofetil
Azathioprine

Surgery, Trauma, and Transplantation	**7.0 %** of Exam
Cardiovascular and vascular surgery	<2%
Cardiac	
Mediastinal disease	
Vascular, aortic and peripheral	
Thoracic	
Abdominal and gastrointestinal	<2%
Acute abdomen	
Postoperative complications	
Mesenteric ischemia and ischemic colitis	
Abdominal compartment syndrome	
Genitourinary and obstetric emergencies	<2%
Urologic	
Obstetric	
Skin and soft tissues and extremities	<2%
Soft tissue infections	
Crush injury, myonecrosis, and rhabdomyolysis	
Necrotizing fasciitis	
Acute compartment syndrome	
Environmental injury	3.5%
Inhalation injury	
Hypothermia	
Submersion injury, near-drowning, and diving trauma	
Altitude injury	
Electrical injury and lightning strike	
Radiation injury	
Bioterrorism, noninfectious	
Heatstroke	
Burn injury	
General postoperative management	<2%

Trauma <2%

- Flail chest
- Pulmonary contusion
- Hemothorax
- Great vessel injury
- Airway injury, tracheobronchial laceration and rupture
- Foreign body aspiration
- Blunt myocardial injury
- Fat embolism syndrome
- Intra-abdominal injury
- Massive bleeding
- Shock

Transplantation <2%

- Heart
- Lung
- Liver
- Kidney
- Pancreas and intestines
- Organ donation

Pharmacology and Toxicology — **4.5%** of Exam

Basic pharmacologic principles <2%

- Pharmacokinetics
- Dosing adjustments for disease states

Drug-drug interactions <2%

Adverse effects of drugs <2%

- Immunologic allergic reactions
  - Anaphylaxis
  - Thrombotic thrombocytopenic purpura
  - Stevens-Johnson syndrome
- Nonimmunologic adverse effects of drugs
  - Electrolyte and metabolic
  - Hyperthermia
  - Neurologic
  - Renal
  - Hematologic
  - Cardiac

Toxicology, drug overdose, and poisoning <2%

- Acetaminophen

Beta-adrenergic blockers
Calcium channel blockers
Cyanide
Tricyclic antidepressants
Nitroprusside
Oral antihyperglycemic agents
Organophosphates
Salicylates
Sarin (nerve) gas
Selective serotonin reuptake inhibitors (SSRIs)
Additional psychotropic drugs
Scombroid food poisoning
Muscle relaxants
Xanthines
Iron toxicity
Antibiotic toxicity
Carbon monoxide
Methemoglobinemia

Research, Administration, and Ethics	**2.0%** of Exam
Intensive care unit (ICU) administration	<2%
Regulatory issues	
Intensive care unit (ICU) physical design	
Continuous quality improvement and patient safety	
Isolation	
Staffing issues	<2%
Physician extenders in the intensive care unit (ICU)	
Interactions between hospitalists and intensivists	
Medicolegal interactions	<2%
Ethical considerations	<2%
Patient autonomy	
Legal surrogates	
Informed consent for medical procedures	
Brain death (also see entry in Neurologic Disorders)	<2%
Conflict of interest	<2%
Advance directives	<2%
Patient confidentiality and Health Insurance Portability and Accountability Act (HIPAA) regulations	<2%
End-of-life issues	<2%

Organ donation	<2%
Medical futility	<2%
Medical research	<2%
Clinical trial design	
Statistical analysis	
Institutional review boards	
Teaching and education	<2%
Teaching formats	
Psychosocial issues	<2%
Professionalism	
Intensive care unit (ICU) burnout	
Impaired health-care professional	

Critical Care Ultrasound Scanning	**2.0%** of Exam
Cardiac	<2%
Pulmonary	<2%
Abdominal	<2%
Neurologic	<2%
Vascular	<2%

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