**Critical Care Medicine**

Certification Examination Blueprint

**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:

<table>
<thead>
<tr>
<th>Medical Content Category</th>
<th>% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal, Endocrine, and Metabolic Disorders</td>
<td>15.0%</td>
</tr>
<tr>
<td>Cardiovascular Disorders</td>
<td>17.5%</td>
</tr>
<tr>
<td>Pulmonary Disease</td>
<td>20.0%</td>
</tr>
<tr>
<td>Infectious Disease</td>
<td>12.0%</td>
</tr>
<tr>
<td>Gastrointestinal Disorders</td>
<td>5.0%</td>
</tr>
<tr>
<td>Neurologic Disorders</td>
<td>9.5%</td>
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<tr>
<td>Hematologic and Oncologic Disorders</td>
<td>5.5%</td>
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<tr>
<td>Surgery, Trauma, and Transplantation</td>
<td>7.0%</td>
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<tr>
<td>Pharmacology and Toxicology</td>
<td>4.5%</td>
</tr>
<tr>
<td>Research, Administration, and Ethics</td>
<td>2.0%</td>
</tr>
<tr>
<td>Critical Care Ultrasound Scanning</td>
<td>2.0%</td>
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<tr>
<td><strong>100%</strong></td>
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</tbody>
</table>
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).

**Exam format**

The exam is composed of multiple-choice questions with a single best answer, predominantly describing patient scenarios. Questions 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.


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.

<table>
<thead>
<tr>
<th>Renal, Endocrine, and Metabolic Disorders</th>
<th>15% of Exam</th>
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</thead>
<tbody>
<tr>
<td><strong>Sodium-water balance</strong></td>
<td>2%</td>
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<tr>
<td>Hyponatremia</td>
<td></td>
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<tr>
<td>Syndrome of inappropriate antidiuretic hormone secretion</td>
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<tr>
<td>Cerebral salt wasting</td>
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<tr>
<td>Psychogenic polydipsia</td>
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<tr>
<td>Hypothyroidism</td>
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<tr>
<td>Iatrogenic</td>
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<tr>
<td>Exercise-induced</td>
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</tbody>
</table>
Hypernatremia
  Central diabetes insipidus
  Nephrogenic diabetes insipidus
  Osmotic diuresis
  Primary hypodipsia
  Dehydration
  Gastrointestinal fluid losses

Hypovolemia

Hypovolemia

Potassium disorders
  <2%

Hyperkalemia
  Pseudohyperkalemia
  Drug-induced
  Adrenal insufficiency
  Renal tubular acidosis

Hypokalemia
  Vomiting
  Diarrhea
  Renal losses
    Drug-induced
    Renal tubular acidosis

Acid-base disorders
  4.5%

Metabolic acidosis
  Increased anion gap
    Lactic acidosis
    Ketoacidosis
    Hypoalbuminemia

Normal anion gap
  Diarrhea
  Saline resuscitation-associated
  Drug-induced
  Renal tubular acidosis
  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
  Euthyroid sick syndrome

Parathyroid disorders  <2%

Adrenal disorders  <2%
  Adrenal insufficiency
    Relative adrenal insufficiency in critical illness
  Adrenal excess

Pituitary disorders  <2%

Tumor-related syndromes  <2%
  Pheochromocytoma
  Carcinoid

Acute renal failure  2%
  Contrast-induced
  Pigment-induced
  Oncology-related
  Pre-renal disease
  Intrinsic disease
Glomerulonephritis
Interstitial nephritis
Rhabdomyolysis
Acute tubular necrosis
Renal replacement therapy

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<thead>
<tr>
<th><strong>Cardiovascular Disorders</strong></th>
<th><strong>17.5% of Exam</strong></th>
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<tbody>
<tr>
<td><strong>Acute coronary syndromes</strong></td>
<td>&lt;2%</td>
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<tr>
<td>Unstable angina pectoris and non-ST-segment elevation myocardial infarction (NSTEMI)</td>
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<tr>
<td>Unstable angina pectoris</td>
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<tr>
<td>NSTEMI</td>
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<tr>
<td>ST-segment elevation myocardial infarction (STEMI)</td>
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<tr>
<td>Diagnosis</td>
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<td>Complications</td>
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<td>Heart failure, cardiogenic shock</td>
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<tr>
<td>Ventricular septal defect</td>
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<td>Acute mitral regurgitation</td>
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<td>Ventricular wall rupture</td>
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<td>Electrical conduction abnormalities</td>
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<tr>
<td>Right ventricular failure</td>
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<tr>
<td>Arrhythmias</td>
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<tr>
<td>Management of STEMI</td>
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<tr>
<td>Cocaine-related ischemia</td>
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<tr>
<td><strong>Arrhythmias</strong></td>
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<tr>
<td>Supraventricular tachycardia</td>
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<tr>
<td>Atrial fibrillation</td>
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<td>Atrial flutter</td>
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<tr>
<td>Multifocal atrial tachycardia</td>
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<tr>
<td>Pre-excitation syndromes</td>
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<tr>
<td>Paroxysmal supraventricular tachycardia</td>
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<tr>
<td>(atrioventricular [AV] nodal reentrant tachycardia)</td>
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<tr>
<td>Ventricular arrhythmias</td>
<td></td>
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<tr>
<td>Nonsustained ventricular tachycardia</td>
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<tr>
<td>Monomorphic ventricular tachycardia</td>
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<tr>
<td>Polymorphic ventricular tachycardia</td>
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<tr>
<td>Ventricular fibrillation</td>
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<td>Accelerated idioventricular rhythm</td>
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<td>Long QT syndrome</td>
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<tr>
<td>Brugada syndrome</td>
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</tbody>
</table>
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

**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

**Respiratory failure**
- Hypoxemic
- Hypercapnic

**Mechanical ventilation**
- Initiation and maintenance of mechanical ventilation
  - Endotracheal intubation and tracheostomy
- Modes
- Oxygenation
- Ventilation (CO₂)
- 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**
- 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**
- 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 jiroveci pneumonia
   Viral pneumonia

Tuberculosis
Pulmonary edema
   Neurogenic
   Tocolytic
   Negative-pressure
   High-altitude
Hypersensitivity pneumonitis
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**

- Sepsis and septic shock
- Bacterial infections (typical and atypical)
  - Tuberculosis
  - Atypical mycobacterial infections
  - Nocardiosis
  - Listeriosis
  - Brucellosis
  - Typhoid fever
  - Tularemia
  - Plague
- Rickettsial infections
  - Rocky Mountain spotted fever
- Spirochetal infections
  - Lyme disease
  - Leptospirosis
  - Ehrlichiosis

**Fungal infections**

**Viral infections**

**Parasitic diseases**

- Malaria
- Babesiosis
- *Strongyloides* hyperinfection syndrome
- Giardiasis

**Central nervous system infections**

**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**
- Eye and orbit
- Septic cavernous sinus thrombosis
- Soft tissue infections of the head and neck
- Sinusitis
- Epiglottitis

**Cardiovascular infections**
- Pericarditis
- Endocarditis
- Device-related infections
  - Catheter-related infections (peripheral, central venous, arterial, pulmonary artery)

**Gastrointestinal and intra-abdominal infections**
- Esophageal
- Liver
- Gallbladder and biliary
- Pancreatitis
  - Necrotizing (infected)
  - Pancreatic abscess
- Gastroenteritis
  - Community-acquired bacterial
- Colitis and diverticulitis
  - *Clostridium difficile*-associated
- Parasitic
- Necrotizing enterocolitis (typhlitis)
- Cytomegalovirus colitis
- Peritonitis
- Small intestine and appendix

**Genitourinary tract infections**
- Cystitis, including catheter-related
- Pyelonephritis
- Perinephric abscess

**Soft tissue, bone, and joint infections**
- Bites
- Septic arthritis

**Infections associated with nonvascular transcutaneous catheters**
Antimicrobial therapy and resistance

- Nonallergic toxicity
- Allergic reactions
- Resistant organisms
  - Gram-positive organisms
  - Gram-negative organisms
  - Fungi and inherent susceptibility patterns and resistance

Pharmacokinetics

Infections in immunocompromised hosts

- Opportunistic infections in human immunodeficiency virus (HIV) infection
- Neutropenia
- Transplantation
  - Solid organ
  - Hematopoietic cell
- Asplenia
- Corticosteroid immunosuppression

Virulence factors

- Toxic shock

Bioterrorism

Hospital infection control

Gastrointestinal Disorders  5.0% of Exam

Esophagus

- Corrosive injury
- Perforation and rupture
- Fistula

Stomach

- Peptic ulcer disease
- Non-peptic ulcer disease
- Perforation
- Mechanical disorders

Small intestine

- Perforation
- Hemorrhage
- Mechanical and motility disorders
- Inflammatory bowel diseases
Large intestine

- Perforation
- Hemorrhage
- Mechanical and motility disorders
- Colonic ischemia

Liver

- 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

- Pancreatitis
  - Infectious
  - Gallbladder disease
  - Tumor
  - Alcohol- and drug-induced
  - Toxin exposure
  - Hypertriglyceridemia-induced
  - Complications
Gallbladder and biliary tract
- 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 caused by 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 brain injury
  - Metabolic encephalopathy
  - Drug-induced encephalopathy
  - Drug and alcohol withdrawal
  - ICU-related delirium

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
  Blood products
  Apheresis
  Adverse effects
  Massive blood transfusion
  Transfusion refusal

Solid tumors

Oncologic syndromes
  Superior vena cava syndrome
  Tumor lysis syndrome
  Spinal cord compression
  Hyperviscosity syndrome
  Hypercalcemia

Hematopoietic cell transplantation
  Graft-versus-host disease
  Hepatic sinusoidal obstruction syndrome
  (veno-occlusive disease)
  Respiratory distress

Complications of immunosuppressive drugs and chemotherapy
  Cyclosporine
  Corticosteroids
  Alkylating agents
  Methotrexate
  Sirolimus
  Tacrolimus
  Mycophenolate mofetil
  Azathioprine

Surgery, Trauma, and Transplantation  7.0 % of Exam

Cardiovascular and vascular surgery
  Cardiac
  Mediastinal disease
  Vascular, aortic and peripheral
  Thoracic

Abdominal and gastrointestinal
  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
<table>
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<tr>
<th>Pharmacology and Toxicology</th>
<th>4.5% of Exam</th>
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<tbody>
<tr>
<td><strong>Basic pharmacologic principles</strong></td>
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<tr>
<td>Pharmacokinetics</td>
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<tr>
<td>Dosing adjustments for disease states</td>
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<tr>
<td><strong>Drug-drug interactions</strong></td>
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<tr>
<td><strong>Adverse effects of drugs</strong></td>
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<tr>
<td>Immunologic allergic reactions</td>
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<td>Anaphylaxis</td>
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<td>Thrombotic thrombocytopenic purpura</td>
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<td>Stevens-Johnson syndrome</td>
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<td>Nonimmunologic adverse effects of drugs</td>
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<td>Electrolyte and metabolic</td>
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<td>Hyperthermia</td>
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<td>Neurologic</td>
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<td>Renal</td>
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<td>Hematologic</td>
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<td>Cardiac</td>
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<td><strong>Toxicology, drug overdose, and poisoning</strong></td>
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<tr>
<td>Acetaminophen</td>
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<td>Beta-adrenergic blockers</td>
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<td>Calcium channel blockers</td>
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<td>Cyanide</td>
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<td>Tricyclic antidepressants</td>
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<td>Nitroprusside</td>
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<td>Oral antihyperglycemic agents</td>
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<td>Organophosphates</td>
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<td>Salicylates</td>
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<td>Sarin (nerve) gas</td>
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<td>Selective serotonin reuptake inhibitors (SSRIs)</td>
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<td>Additional psychotropic drugs</td>
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<td>Scombroid food poisoning</td>
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<td>Muscle relaxants</td>
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<td>Xanthines</td>
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<td>Iron toxicity</td>
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<td>Antibiotic toxicity</td>
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<td>Carbon monoxide</td>
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<td>Methemoglobinemia</td>
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### Research, Administration, and Ethics 2.0% of Exam

<table>
<thead>
<tr>
<th>Topic</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Intensive care unit (ICU) administration</td>
<td>&lt;2%</td>
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<tr>
<td>Regulatory issues</td>
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<tr>
<td>Intensive care unit (ICU) physical design</td>
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<tr>
<td>Continuous quality improvement and patient safety</td>
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<tr>
<td><strong>Staffing issues</strong></td>
<td>&lt;2%</td>
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<tr>
<td>Physician extenders in the intensive care unit (ICU)</td>
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<tr>
<td>Interactions between hospitalists and intensivists</td>
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<td><strong>Medicolegal interactions</strong></td>
<td>&lt;2%</td>
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<tr>
<td><strong>Ethical considerations</strong></td>
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<tr>
<td>Patient autonomy</td>
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<td>Legal surrogates</td>
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<td>Informed consent for medical procedures</td>
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<tr>
<td><strong>Brain death</strong> (also see entry in Neurologic Disorders)</td>
<td>&lt;2%</td>
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<tr>
<td><strong>Conflict of interest</strong></td>
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<tr>
<td><strong>Advance directives</strong></td>
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<tr>
<td><strong>Patient confidentiality and Health Insurance Portability and</strong></td>
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<td>Accountability Act (HIPAA) regulations</td>
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<tr>
<td><strong>End-of-life issues</strong></td>
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<td><strong>Organ donation</strong></td>
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<tr>
<td><strong>Medical futility</strong></td>
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<tr>
<td><strong>Medical research</strong></td>
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<tr>
<td>Clinical trial design</td>
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<tr>
<td>Statistical analysis</td>
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<td>Institutional review boards</td>
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<td><strong>Teaching and education</strong></td>
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<td>Teaching formats</td>
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<tr>
<td><strong>Psychosocial issues</strong></td>
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<td>Professionalism</td>
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<td>Intensive care unit (ICU) burnout</td>
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<td>Impaired health-care professional</td>
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#### Critical Care Ultrasound Scanning 2.0% of Exam

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<th>Topic</th>
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<tr>
<td>Neurologic</td>
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<tr>
<td>Vascular</td>
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January, 2017