



CRITICAL CARE MEDICINE EXAMINATION

CONTENT OUTLINE

Critical Care Medicine Examination
CONTENT OUTLINE

Updated January 2017

1. Basic Pathophysiology

A. Central Nervous System

1. Altered mental status
2. Brain death
3. Cerebral blood flow
4. Degenerative disease of the brain (e.g. Alzheimer's disease, Parkinson's disease)
5. Infection
6. Intracranial compliance, mass lesion
7. Neuromuscular disorders
8. Seizures and status epilepticus
9. Spinal cord injury
10. Stroke
 - a. Embolic/thrombotic
 - b. Hemorrhagic
 - c. Ischemic
11. Vascular malformations (e.g. aneurysms, AV malformations)

B. Cardiovascular

1. Cardiac transplantation
2. Congenital heart disease in adults
 - a. Eisenmenger syndrome
 - b. Tetralogy of Fallot
 - c. Intracardiac Shunts
 - d. Other
3. Coronary artery disease, myocardial ischemia/infarction
4. DVT
5. Hypertension
 - a. Pulmonary hypertension
 - b. Systemic hypertension
6. Infection/inflammation
 - a. Endocarditis
 - b. Myocarditis
 - c. Pericarditis
7. Myocardial function/dysfunction
 - a. Left ventricular
 1. Diastolic dysfunction
 2. Systolic dysfunction
 - b. Right ventricular
8. Peripheral vascular disease
 - a. Aneurysm, abdominal
 - b. Aneurysms, thoracic
 - c. Dissections
 - d. Other
9. Rhythm disturbances
 - a. Asystole
 - b. Supraventricular tachyarrhythmias, including atrial flutter, fibrillation
 - c. Heart block
 - d. Junctional or nodal rhythm
 - e. Pulseless Electrical Activity (PEA)
 - f. Ventricular tachycardia/fibrillation

- g. Other conduction abnormalities (e.g. WPW)
- 10. Shock states
 - a. Cardiogenic
 - b. Distributive (e.g. sepsis, neurogenic/spinal, anaphylactic/anaphylactoid)
 - c. Hypovolemic (e.g. hemorrhagic shock)
 - d. Obstructive (e.g. pulmonary embolism)
- 11. Structural
 - a. Pericardial
 - b. Other myocardial
 - c. Valvular
 - 1. Aortic valve
 - a. Aortic Insufficiency
 - b. Aortic Stenosis
 - c. Hypertrophic cardiomyopathy (HOCM, ASH, IHSS)
 - 2. Mitral valve
 - a. Mitral Regurgitation
 - b. Mitral Stenosis
 - 3. Pulmonary valve
 - a. Pulmonic insufficiency
 - b. Pulmonic stenosis
 - 4. Tricuspid valve dysfunction
- 12. Oxygen supply and demand
- 13. Trauma
 - a. Cardiac contusion
 - b. Other
- 14. Other (e.g. pulmonary edema, pulsus paradoxus)

C. Pulmonary

- 1. Airway diseases
 - a. Obstructive
 - b. Reactive
 - c. Restrictive
- 2. Aspiration
- 3. Embolic disorders
- 4. Infection
 - a. Empyema/abscess
 - b. Mediastinitis
 - c. Pneumonia
 - 1. Community-acquired
 - 2. Health-care associated
 - 3. Ventilator-associated
 - d. Tracheobronchitis
- 5. Inflammatory and autoimmune diseases
- 6. Lung transplantation
- 7. Airway disruption
 - a. Tracheal disruption
 - b. Pneumothorax, volutrauma
 - c. Bronchopleural fistula
- 8. Pleural effusion
- 9. Chest trauma (e.g. pulmonary contusion, flail chest)
- 10. Pulmonary mechanics (e.g. work of breathing)
- 11. Respiratory failure

- a. ARDS
- b. Hypoxic (acute and chronic)
- c. Hypercapnic (acute and chronic)
- d. Other ventilation-perfusion abnormalities
- e. TRALI
- f. Sleep apnea
 - 1. Obstructive
 - 2. Central
- g. Other

12. Lung and chest wall tumors

D. Renal

- 1. Infection
- 2. Renal failure
 - a. Intrinsic renal
 - b. Post-renal
 - c. Pre-renal
- 3. Renal tubular acidosis

E. Hematologic/Oncologic

- 1. Bone marrow/stem cell transplantation
- 2. Coagulopathies
 - a. Acquired
 - 1. DIC
 - 2. Isolated factor abnormalities
 - 3. Vitamin K dependent coagulopathy
 - b. Congenital
- 3. Fibrinolysis
- 4. Hemoglobin abnormalities
 - a. Anemia
 - b. Polycythemia
 - c. Carboxyhemoglobin
 - d. Methemoglobin
 - e. Other hemoglobinopathies (e.g. sickle cell disease, Thalassemia)
- 5. Platelet abnormalities
 - a. Thrombocytopenia
 - b. Thrombocytosis
 - c. Other (e.g. thrombocytopenic purpura, ITP)
- 6. Tumor lysis syndrome
- 7. White blood cell disorder
- 8. Leukemia, lymphoma
- 9. Other

F. Obstetric

- 1. Complications of pregnancy
 - a. Coagulopathy, bleeding disorders
 - b. Emboli (amniotic fluid, thromboemboli, other)
 - c. Liver function abnormalities (e.g. acute fatty liver, HELLP)
 - d. Pre-eclampsia/eclampsia
 - e. Other
- 2. Physiology of pregnancy
- 3. Respiratory physiology of pregnancy
 - a. Airway changes
 - b. Pulmonary physiology

G. Endocrine

1. Adrenal
 - a. Adrenal insufficiency
 - b. Cushing syndrome
 - c. Pheochromocytoma
2. Diabetes mellitus
 - a. Hyperglycemia, including diabetic ketoacidosis (DKA), nonketotic hyperglycemic coma (NKHHC)
 - b. Hypoglycemia
3. Pituitary
 - a. Cerebral salt wasting
 - b. Diabetes Insipidus, including central, nephrogenic
 - c. SIADH
4. Thyroid function abnormalities
 - a. Critical illness effects on thyroid function
 - b. Hyperthyroidism, including thyroid storm
 - c. Hypothyroidism, including myxedema
5. Other (e.g. carcinoid)

H. Gastrointestinal

1. Abdominal compartment syndrome
2. Bowel disorders
 - a. Infectious
 - b. Perforation, volvulus
 - c. Pseudomembranous colitis
 - d. Vascular diseases
3. Gall bladder disease (stones, cholecystitis)
4. Stomach
 - a. GI hemorrhage
 1. Lower
 2. Upper
 - b. GI motility dysfunction
 1. Diarrhea, nausea, vomiting
 2. Ileus
 3. Malabsorption
 4. Toxic megacolon
 5. Other
5. Pancreas
 - a. Pancreatitis
 - b. Pancreatic cancer
6. Hepatic
 - a. Hepatic dysfunction/failure (acute and chronic)
 - b. Hepatic encephalopathy
 - c. Hepatitis
 - d. Hepatocellular carcinoma
 - e. Hepatorenal syndrome
 - f. Other

I. Dermatologic

1. Allergic reactions
2. Disruption of the skin barrier
3. Infection
 - a. Cellulitis

- b. Necrotizing fasciitis
- c. Other
- 4. Inflammatory diseases of the skin
- 5. Stevens Johnson Syndrome

J. Immunologic/Infectious Disease

- 1. Autoimmune
 - a. Mixed connective tissue disease
 - b. RA
 - c. SLE
 - d. Vasculitides
 - e. Other
- 2. Immune suppression
 - a. Acquired
 - 1. HIV/AIDS
 - 2. Other
 - b. Congenital
- 3. Graft vs. host disease

K. Acid-base and electrolyte abnormalities

- 1. Acid-base abnormalities
 - a. Metabolic
 - b. Mixed
 - c. Respiratory
- 2. Electrolyte abnormalities
 - a. Calcium
 - b. Chloride
 - c. Magnesium
 - d. Phosphorus
 - e. Potassium
 - f. Sodium
 - g. Other

2. Critical Illness Diagnosis and Management

A. Central Nervous System

1. Diagnoses

- a. Altered mental status
 1. Coma
 2. Delirium
 3. Hallucinations
 4. Other (e.g. hypoxic/metabolic encephalopathy)
- b. Brain death
- c. Degenerative disease of the brain (e.g. Alzheimer's disease, Parkinson's disease)
- d. Head injury, closed or open
- e. Infectious
 1. Abscess
 2. Encephalitis
 3. Meningitis/ventriculitis
- f. Neuromuscular disorders
 1. Critical illness polyneuropathy
 2. Demyelinating
 3. Guillain-Barré Syndrome
 4. Myasthenia gravis
 5. Myopathy
 6. Other
- g. Seizures and status epilepticus
- h. Spinal cord injury
- i. Stroke
 1. Embolic/thrombotic
 2. Hemorrhagic (Subarachnoid, subdural, epidural hematoma)
 3. Ischemic
- j. Subarachnoid, subdural, epidural hematoma
- k. Vascular malformations (e.g. aneurysms, AV malformations)
- l. Pituitary disorders (e.g. acromegaly, Sheehan's Syndrome)

2. Diagnostic modalities

- a. Angiography
- b. EEG, processed EEG
- c. Evoked potential
- d. ICP measurement
- e. Other imaging (e.g. CT, CTA, MRI, MRA)
- f. Jugular venous saturation
- g. Lumbar puncture
- h. Nerve conduction studies/EMG
- i. Nuclear medicine studies (e.g. cerebral blood flow)
- j. Transcranial Doppler
- k. Other (e.g. microdialysis)

3. Management strategies

- a. Anticonvulsants
- b. Antimicrobials
- c. ICP-controlling medications
- d. Interventional radiology (e.g. coiling, clipping, vasospasm therapies)
- e. Neuroprotectants
- f. Steroids
- g. Surgical interventions

- h. Vasoactive drugs
- i. Plasmapheresis/plasma exchange
- j. Other therapies, e.g. CSF drainage

B. Cardiovascular

1. Diagnoses
 - a. Cardiac transplantation, rejection, complications
 - b. Congenital heart disease in adults
 1. Eisenmenger syndrome
 2. Tetralogy of Fallot
 3. Other
 - c. Coronary artery disease, myocardial ischemia/infarction
 - d. Hypertension
 1. Pulmonary hypertension
 2. Systemic hypertension
 - e. Infectious
 1. Endocarditis
 2. Myocarditis
 3. Pericarditis
 - f. Myocardial function/dysfunction
 1. Left ventricular
 - a. Diastolic dysfunction
 - b. Systolic dysfunction
 2. Right ventricular
 - g. Peripheral vascular disease
 1. Aneurysms, thoracic
 2. Aneurysm, abdominal
 3. Dissections
 4. Other
 - h. Rhythm disturbances
 1. Asystole
 2. Atrial flutter/fibrillation
 3. Supraventricular tachyarrhythmias, other
 4. Heart block
 5. Junctional or nodal rhythm
 6. Pulseless Electrical Activity (PEA)
 7. Ventricular tachycardia/fibrillation
 8. Other conduction abnormalities (e.g. WPW)
 - i. Shock states
 1. Cardiogenic
 2. Distributive (e.g. sepsis, neurogenic/spinal, anaphylactic/Anaphylactoid)
 3. Hypovolemic (e.g. hemorrhagic shock)
 4. Obstructive (e.g. pulmonary embolism)
 - j. Structural
 1. Cardiac contusion
 2. Other myocardial
 3. Acquired ASD, VSD
 4. Cardiomyopathy
 5. Non-infectious myocarditis
 6. Papillary muscle dysfunction
 7. Stunned myocardium
 8. Stress-induced cardiomyopathy (e.g. Takotsubo syndrome)

- 9. Pericardial
 - a. Pericardial effusion
 - b. Pericarditis
 - c. Tamponade
- 10. Systemic oxygen supply and demand
- 11. Traumatic
- 12. Valvular
 - a. Aortic
 - 1. Insufficiency
 - 2. Stenosis
 - 3. Hypertrophic cardiomyopathy (HOCM, ASH, IHSS)
 - b. Mitral
 - 1. Regurgitation
 - 2. Stenosis
 - c. Pulmonic valve disease
 - 1. Regurgitation
 - 2. Stenosis
 - d. Tricuspid valve disease
- 13. Other (e.g. Noncardiogenic pulmonary edema, pulsus paradoxus)
- 2. Diagnostic modalities
 - a. Hemodynamic monitoring
 - 1. Arterial pressure
 - 2. Cardiac output monitoring
 - 3. CVP
 - 4. ECG
 - 5. Other
 - b. Imaging
 - 1. CT, MRI
 - 2. Interventional imaging
 - 3. Nuclear imaging
 - 4. Cardiac Ultrasound (TTE, TEE)
 - 5. Other Bedside Ultrasound (assessment of intravascular volume, etc.)
- 3. Management strategies
 - a. Anticoagulants and antithrombotics
 - 1. Antiplatelet agents
 - 2. Heparin
 - a. Heparinoids
 - b. LMWH
 - c. Unfractionated
 - 3. Thrombin inhibitors (e.g. lepirudin, argatroban)
 - 4. Thrombolytics
 - 5. Antifibrinolytics
 - 6. Warfarin
 - 7. Other
 - b. Antidysrhythmics
 - c. Antimicrobials
 - d. Circulatory support systems
 - 1. ECMO
 - 2. Pacemakers/defibrillators
 - a. AICDs
 - b. External defibrillators

- c. Transthoracic
- d. Transvenous/epicardial
- 3. Left or right ventricular assist device
- 4. Intraaortic balloon pump
- e. Pericardiocentesis
- f. Vasoactive or modulating drugs
 - 1. Antihypertensives
 - 2. Inotropes/chronotropes/lusitropes
 - 3. Vasoconstrictors
 - 4. Vasodilators
- g. Other

C. Pulmonary

1. Diagnoses
 - a. Airway diseases
 1. Obstructive
 2. Reactive
 3. Restrictive
 - b. Airway disruption (e.g. pneumothorax, volutrauma)
 - c. Aspiration
 - d. Chest trauma (e.g. pulmonary contusion, flail chest)
 - e. Embolic disorders
 1. Air
 2. Fat
 3. Thromboembolic
 4. Other
 - f. Infection
 1. Empyema/abscess
 2. Mediastinitis
 3. Pneumonia
 - a. Community-acquired
 - b. Health care associated
 - c. Ventilator associated
 4. Tracheobronchitis
 - g. Inflammatory and autoimmune diseases
 - h. Lung and chest wall tumors
 - i. Lung transplantation, rejection, complications
 - j. Pleural effusion
 - k. Respiratory failure
 1. ARDS
 2. Hypercapnic (acute and chronic)
 3. Hypoxic (acute and chronic)
 4. TRALI
 5. Other
 - l. Volutrauma/barotrauma
2. Diagnostic modalities
 - a. Arterial blood gas
 - b. Capnography
 - c. Imaging
 1. Chest x-ray
 2. CT/MRI
 3. Nuclear studies

- d. Laryngoscopy and bronchoscopy
- e. Pulmonary function studies/pulmonary mechanics
- f. Pulse oximetry
- g. Sleep studies
- h. Thoracentesis
- 3. Management strategies
 - a. Antimicrobials/antivirals
 - b. Management of bronchopleural and bronchocutaneous fistulae
 - c. Pleural drainage and evacuation (e.g. thoracentesis, chest tube placement)
 - d. Pulmonary medications
 - e. Vaccination (Pneumovax)
 - f. Ventilatory support
 - 1. Invasive ventilation modes
 - a. Airway pressure-release ventilation
 - b. Assist control
 - c. High-frequency/oscillation
 - d. PC/volume control
 - e. Pressure-support ventilation
 - f. SIMV
 - 2. Noninvasive
 - a. BiPAP
 - b. CPAP
 - 3. Spontaneous breathing trials
 - 4. Other ventilator strategies
 - a. Differential lung ventilation
 - b. Positioning (e.g. prone)

D. Renal

- 1. Diagnoses
 - a. Infection
 - b. Renal failure
 - 1. Contrast induced-nephropathy
 - 2. Intrinsic renal
 - 3. Post-renal
 - 4. Pre-renal
 - 5. Renal tubular acidosis
 - c. Renal trauma
 - d. Renal transplantation (e.g. rejection)
- 2. Diagnostic modalities
 - a. Electrolytes, osmolarity, and specific gravity (serum, urine)
 - b. Imaging
 - 1. Angiography
 - 2. CT/MRI
 - 3. Diagnostic x-ray
 - 4. Ultrasound
 - c. Renal biopsy
- 3. Management strategies
 - a. Fluid and electrolyte management
 - b. Pharmacologic therapies
 - 1. Antimicrobials/antifungals
 - 2. Buffers
 - 3. Diuretic therapy

- 4. N-acetylcysteine
- c. Renal replacement therapies
 - 1. Continuous renal replacement therapies including ultrafiltration
 - 2. Intermittent hemodialysis
 - 3. Peritoneal dialysis

E. Hematologic/Oncologic

- 1. Diagnoses
 - a. Bone marrow/stem cell transplantation, rejection, complications
 - b. Coagulopathies
 - 1. Acquired
 - a. DIC
 - b. Isolated factor abnormalities
 - c. Vitamin K dependent
 - 2. Congenital
 - c. Fibrinolysis
 - d. Hemoglobin abnormalities
 - 1. Anemia
 - 2. Polycythemia
 - 3. Carboxyhemoglobin
 - 4. Methemoglobin
 - 5. Other hemoglobinopathies (e.g. sickle cell disease, Thalassemia)
 - e. Hypercoagulable state
 - f. Platelet abnormalities
 - 1. Thrombocytopenia (including HIT)
 - 2. Thrombocytosis
 - 3. Other (e.g. thrombocytopenic purpura, ITP)
 - g. Tumor lysis syndrome
 - h. White blood cell disorder
 - i. Leukemia, lymphoma
 - j. Other
- 2. Diagnostic modalities
 - a. Bone marrow biopsy, culture
 - b. Coagulation studies (e.g. PT, PTT, TEG, factor levels)
 - c. Routine blood studies (e.g. CBC, platelets)
- 3. Management strategies
 - a. Anticoagulants
 - 1. Heparin
 - a. Heparinoids
 - b. LMWH
 - c. Unfractionated
 - 2. Warfarin
 - 3. Antiplatelet agents
 - 4. Thrombin inhibitors (e.g. lepirudin, argatroban)
 - 5. Thrombolytics
 - b. Erythropoietin, GCSF
 - c. Plasmapheresis/plasma exchange
 - d. Transfusion and factor replacement
 - e. IVC filters, other mechanical devices
 - f. Other

F. Obstetric

- 1. Diagnoses

- a. Coagulopathy, bleeding disorders
 - b. Emboli (amniotic fluid, thromboemboli, other)
 - c. Liver function abnormalities (e.g. acute fatty liver, HELLP)
 - d. Pre-eclampsia/eclampsia
 - e. Peripartum infection
 - f. Other
2. Diagnostic modalities
 - a. Laboratory studies (serum, urine)
 - b. Ultrasound
 - c. Cardiotocography
 3. Management strategies
 - a. Anticoagulants
 - b. Anticonvulsants
 - c. Antihypertensive therapy
 - d. Antimicrobials
 - e. Delivery

G. Endocrine

1. Diagnoses
 - a. Adrenal
 1. Adrenal insufficiency
 2. Cushing syndrome
 3. Pheochromocytoma
 - b. Diabetes mellitus
 1. Hyperglycemia, including diabetic ketoacidosis (DKA), non-ketotic hyperglycemic coma (NKHG)
 2. Hypoglycemia
 - c. Pituitary
 1. Cerebral salt wasting
 2. Diabetes Insipidus including central, nephrogenic
 3. SIADH
 - d. Thyroid function abnormalities
 1. Critical illness effects on thyroid function
 2. Hyperthyroidism, including thyroid storm
 3. Hypothyroidism, including myxedema
 - e. Other
2. Diagnostic modalities
 - a. CT
 - b. Laboratory studies (serum, urine)
 - c. Ultrasound
3. Management strategies
 - a. Antihypertensives
 - b. Hormone replacement therapy
 - c. Glucose management
 1. Insulin
 2. Oral hypoglycemic agents
 3. Other therapies
 - d. Steroids (glucocorticoid and mineralocorticoid)
 - e. Vasodilators
 - f. Vasopressins/DDAVP

H. Gastrointestinal

1. Diagnoses

- a. Abdominal compartment syndrome
 - b. Bowel disorders
 - c. Gall bladder disease (stones, cholecystitis)
 - d. Stomach
 - 1. Gastritis
 - 2. Ulcer
 - 3. GI hemorrhage
 - a. Lower
 - b. Upper
 - 4. GI motility dysfunction, GERD
 - e. GI hemorrhage
 - f. GI motility dysfunction, GERD
 - g. Pancreas
 - 1. Pancreatitis
 - 2. Pancreatic cancer
 - h. Hepatic
 - 1. Dysfunction/failure, acute and chronic
 - 2. Hepatic encephalopathy
 - 3. Hepatitis
 - 4. Hepatocellular carcinoma
 - 5. Hepatorenal syndrome
 - 6. Liver transplantation, rejection, complications
 - i. Other
2. Diagnostic modalities
- a. Abdominal pressure measurement (bladder pressure, other)
 - b. Assessment of bowel motility
 - c. Endoscopy, upper, lower
 - d. Imaging (CT, MRI, x-ray, nuclear medicine studies, ultrasound)
 - e. Interventional radiology
 - f. Laboratory Studies
 - 1. Coagulation parameters
 - 2. Immunologic studies
 - 3. Nutritional assessment (albumin, prealbumin)
 - 4. Routine blood studies (CBC, electrolytes, renal function)
 - 5. Stool assessment (occult blood, C. diff toxin)
 - 6. Serology (hepatitis, HIV)
 - 7. Urine electrolytes (fractional excretion of sodium)
 - 8. Other
 - 9. Additional relevant studies (e.g.amylase, lipase)
 - g. Biopsy (e.g. liver)
 - h. Endoscopy, upper, lower; ERCP
 - i. Imaging (x-ray, CT, MRI, ultrasound)
 - j. Paracentesis, diagnostic
3. Management strategies
- a. Blood product selection and administration
 - b. Diuretics, renal replacement therapies
 - c. Endoscopy, upper, lower with therapeutic intervention
 - d. Immunotherapy (e.g. IgG)
 - e. Interventional radiology (embolization, coiling)
 - f. Management of increased intracranial pressure
 - g. Nutritional support (enteral, parenteral)

- h. Paracentesis, therapeutic
- i. Pharmacologic management
 - 1. Antimicrobials
 - 2. GI blood flow modulators
 - 3. Immunologic therapy, steroids
 - 4. Lactulose, rifaximin
 - 5. Other
- j. Surgical intervention (timing, therapeutic options)
- k. Vaccination (e.g. hepatitis)

I. Dermatologic

- 1. Diagnoses
 - a. Allergic reactions
 - b. Disruption of the skin barrier, including decubiti, Stevens-Johnson syndrome
 - c. Infection
 - 1. Cellulitis
 - 2. Necrotizing fasciitis
 - 3. Other
 - d. Inflammatory diseases of the skin
 - e. Stevens Johnson Syndrome
- 2. Diagnostic modalities
 - a. Biopsy (with culture and appropriate stains)
 - b. Laboratory studies
 - 1. CBC with differential
 - 2. Immunologic studies
 - 3. Sedimentation rate
- 3. Management strategies
 - a. Pharmacologic
 - 1. Antimicrobials, antihistamines
 - 2. Medication review
 - 3. Steroids, systemic and topical
 - 4. Other immunotherapies
 - 5. Other topical medications
 - b. Wound care (surgical and other)

J. Immune/Infectious Disease

- 1. Diagnoses
 - a. Autoimmune
 - 1. Mixed connective tissue disease
 - 2. RA
 - 3. SLE
 - 4. Vasculitides
 - 5. Other
 - b. Graft vs. host disease
 - c. Immune suppression
 - 1. Acquired
 - a. HIV/AIDS
 - b. Other
 - 2. Congenital
- 2. Diagnostic modalities
 - a. Biopsy, selective aspiration
 - b. Laboratory studies
 - 1. Immunologic studies

- 2. Routine (CBC, etc.)
- 3. Serologies
- 3. Management strategies
 - a. Pharmacologic
 - 1. Antimicrobials (including prophylaxis)
 - 2. HAART
 - 3. Steroids

K. Acid-base and electrolyte abnormalities

- 1. Diagnoses
 - a. Acid-base abnormalities
 - 1. Metabolic
 - 2. Mixed
 - 3. Respiratory
 - b. Electrolyte abnormalities
 - 1. Calcium
 - 2. Chloride
 - 3. Magnesium
 - 4. Phosphorus
 - 5. Potassium
 - 6. Sodium
 - 7. Other
- 2. Diagnostic modalities
 - a. Laboratory studies
 - 1. Albumin
 - 2. Arterial blood gas
 - 3. Electrolytes, osmolarity, and specific gravity (serum, urine)
 - b. Selective imaging
- 3. Management strategies
 - a. Appropriate renal and endocrine strategies
 - b. Electrolyte replacement as appropriate
 - c. Ventilatory support

3. Specialized Areas

A. Biostatistics

1. Number needed to treat
2. Odds ratio
3. Propensity score
4. Regression analysis
5. Relative risk
6. ROC
7. Sample size estimate
8. Sensitivity, specificity
9. Statistical significance (p-value)
10. Statistical tests
 - a. Non-parametric (e.g.; Wilcoxon, Mann Whitney U test, Chi squared, Kaplan Meier curve)
 - b. Parametric (e.g.; t-test, ANOVA)
11. Type 1 and type 2 errors

B. Burns

1. Complications
2. Electrical burns
3. Inhalation injury
4. Management
 - a. Airway management
 - b. Antimicrobials
 - c. Fluids and resuscitation
 - d. Other therapies (hyperbaric, pharmacologic, surgical)

C. Disaster Management

1. Biologic, chemical, and nuclear exposures
2. Epidemic (e.g. SARS, bird flu, toxic exposures)

D. Drowning, fatal, near-drowning

1. Fresh water
2. Salt water

E. ICU Ethics

1. Brain death
2. End-of-life, futility
3. Impaired providers
4. Informed consent
5. Living will/DPOA/Healthcare surrogate
6. Organ donation
7. Palliative care, hospice
8. Patient autonomy

F. ICU Management and Organization

1. Clinical care bundles (e.g. sepsis, catheter management)
2. Compliance
3. Daily wake-up test
4. HIPAA (privacy and security)
5. ICU transport
6. Outcome and performance measures (HCAPS)
7. QA/QI (patient safety)
8. Regulatory requirements
9. Scoring systems (e.g. APACHE)
10. Sedation/analgesia/delirium assessment (e.g. CAM, RASS)

11. Triage and resource utilization

G. Infection Control

1. Environmental exposures
2. Isolation techniques
 - a. General/universal precautions
 - b. Reverse isolation
 - c. Specific isolation procedures
3. Needle stick injuries
4. Nosocomial infections
 - a. Catheter associated infections
 - b. Pneumonia (ventilator associated, hospital associated, etc.)
 - c. UTI, catheter-associated UTI
 - d. Other
5. Preparation techniques

H. Life Support and Resuscitation

1. ACLS
2. ATLS
3. Pediatric Life Support (PALS)
4. Other

I. Nutrition Management

1. Enteral and parenteral nutrition (formula, caloric intake)
2. Enteral tubes
3. Metabolic assessment (basal and stress energy requirements)
 - a. Indirect calorimetry
 - b. Nitrogen balance, other
4. Re-feeding syndrome

J. Pain Management

1. Adjunctive therapies (e.g. hypnosis, acupuncture)
2. Regional analgesia techniques
3. TENS

K. Pharmacology (Indications, Contraindications, and Complications)

1. Antidepressants
 - a. Tricyclic antidepressants
 - b. SSRIs
 - c. Lithium
 - d. Other
2. Antimicrobials
 - a. Antibiotics
 1. Anaerobes
 2. Gram-negative organisms
 3. Gram-positive organisms
 4. Spirochetal and rickettsial
 5. TB
 6. Other
 - b. Antifungal
 - c. Antimicrobial resistance
 - d. Antiparasitic
 - e. Antiviral
 - f. Prophylactic antimicrobials
3. Antipsychotics
4. Genetic considerations

5. Pharmacokinetics and pharmacodynamics and drug metabolism
6. Neuromuscular blocking drugs
7. Sedatives/hypnotics
8. Other

L. Poisonings, Toxic Ingestion, Overdoses

M. Procedures

1. Airway
 - a. LMA/others
 - b. Tracheostomy
 - c. Transtracheal tubes
2. Monitoring techniques and troubleshooting (e.g. cardiac, neurologic, etc.)
3. Ultrasound
 - a. Indications, application
 - b. Physics of Ultrasound
 - c. Interpretation
4. Vascular access
 - a. Arterial
 - b. Intraosseous
 - c. Venous

N. Thermoregulation

1. Hyperthermia
 - a. Heat stroke
 - b. Fever
 - c. Malignant hyperthermia
 - d. Neuroleptic malignant syndrome
2. Hypothermia
 - a. Environmental
 - b. Therapeutic