SHOCK, RESUSCITATION, AND SURGICAL CRITICAL CARE

PART A: SHOCK AND RESUSCITATION

COMPETENCY-BASED KNOWLEDGE OBJECTIVES:

1. Define shock, categorize it based upon type, explain the etiology and pathophysiology of each type of shock:

    a. Cardiogenic

    b. Hypovolemic

    c. Distributive (septic, anaphylactic, neurogenic, and adrenal insufficiency mediated)

    d. Obstructive (cardiac tamponade, tension pneumothorax, pulmonary embolus)

2. Summarize the clinical presentation and hemodynamic parameters associated with each type of shock using clinical terms, such as heart rate, respiratory rate, and blood pressure and filling pressures.

3. Propose an algorithm for diagnosing and initiating treatment for each shock type.

    a. Cardiogenic

    b. Hypovolemic

    c. Distributive (septic, anaphylactic, neurogenic, and adrenal insufficiency mediated)

    d. Obstructive (cardiac tamponade, tension pneumothorax, pulmonary embolus)

4. Discuss the pathophysiology, including the mechanism of arrest, for each of the following situations:

    a. Acute myocardial infarction

    b. Acute dysrhythmia

    c. Congestive heart failure

    d. Hypovolemic shock (blood loss, dehydration)

    e. Burns

f. Hemorrhagic shock (non-traumatic)

g. Septic shock

h. Anaphylactic shock (envenomation, drug related)

i. Acute adrenal insufficiency

j. Penetrating or blunt trauma

(1) Tension pneumothorax

(2) Pericardial tamponade

(3) Hemorrhagic shock

k. Hypothermia

l. Substance abuse

m. Electrical injury

n. Suffocation

o. Acute stroke

5. Explain the indications for and the pharmacokinetics of each of the following drugs:

a. Lidocaine

b. Digoxin

c. Metoprolol

d. Diltiazem

e. Pronestyl

f. Amiodarone

g. Dopamine

h. Dobutamine

i. Adenosine(Adenocard®)

j. Vasopressin

k. Nitroglycerin

l. Amrinone

m. Milrinone

n. Levophed

o. Phenylephrine

p. Epinephrine

6. Summarize the indication and appropriate technique for cardiac support, pressors, and Circulatory Assist Devices (IABP, LVAD, RVAD).

7. Outline the signs and symptoms of acute airway obstruction and define the appropriate intervention in adult and pediatric patients.

8. Outline the surgical housestaff role on the "code team."

9. Explain the physiological impact of mechanically assisted ventilation on the cardiovascular/respiratory system.

10. Analyze methods for initiating and maintaining ventilator/ weaning support.

11. Describe the indications and potential complications for the following surgical interventions:

a. Bag mask ventilation, endotracheal intubation (oral and nasal)

b. Cricothyrotomy

c. Thoracostomy tube

d. Central venous catheter

e. Peripheral vein cutdown

f. Arterial line

g. Pulmonary artery catheter

h. Diagnostic peritoneal lavage (DPL)

i. Resuscitative thoracotomy

j. Pericardiocentesis

k. Thoracentesis

l. Ultrasound

m. Wound exploration

12. Review the importance of serial physical examinations, hemodynamic monitoring, and serial laboratory evaluations, including urine output and lactic acidosis, in assessing patient response to specific resuscitation treatment.

13. Outline the clinical and laboratory indications for transfusion of the following blood products:

a. Packed red cells

b. Fresh frozen plasma

c. Platelets

d. Cryoprecipitate

e. Whole blood

f. Specific clotting factor concentrates (VIII, IX, XII)

g. Recombinant erythropoietin

14. Analyze the potential complications from use of the above products.

15. Older patients represent a special population, presenting key differences in emergency situations. Analyze and use examples to describe the significance of the following characteristics that are more frequent in the older patient:

a. Vague, imprecise symptoms

b. Atypical disease presentation

c. Co-morbidity

d. Polypharmacy (multiple organ specific physician input)

e. Possibility of cognitive impairment

f. Diagnostic tests with different normal values (age adjustments for normal values)

g. Likelihood of decreased functional reserve

h. Inadequate social support systems

16. Describe the role and indications (if any) for the following products in acute resuscitation:

a. Recombinant activated Protein C

b. Hespan and similar products

c. Albumin

17. Assess the indications, guidelines, and potential complications of the following cardiovascular drugs:

a. Dopamine

b. Dobutamine

c. Phenylephrine

d. Vasopressin

e. Epinephrine

f. Norepinephrine

g. Amrinone

h. Nitroglycerine

i. Esmolol

j. Nipride

k. Diltiazem

18. Analyze and explain factors involved in blood pressure overestimation in the older patient (pseudohypertension, arteriosclerosis, arm size cuff discrepancies).

COMPETENCY-BASED PERFORMANCE OBJECTIVES:

1. Complete and pass Advanced Cardiac Life Support (ACLS), Advanced Trauma Life Support (ATLS).

2. Manage the unconscious patient (seizure).

3. Serve on the code team and the trauma team.

4. Recognize and manage airway obstruction.

5. Perform endotracheal and nasotracheal intubation.

6. Use disposable airway equipment, (e.g., bags, gloves) as transmissible infection precautions.

7. Perform cricothyrotomy and tracheostomy.

8. Manage mechanical ventilator equipment.

9. Manage flail chest (pneumothorax, hemothorax, obstructive shock states).

10. Manage carbon monoxide poisoning.

11. Diagnose cardiac arrest and rhythm disturbances

12. Apply closed chest cardiac massage (CPR).

13. Perform closed chest defibrillation.

14. Perform venous access procedures, including subclavian and jugular and femoral vein catheterizations and saphenous vein cutdown.

15. Determine the indication, dosage, contraindications, and method of administration of the following medications:

   a. Morphine

   b. Lidocaine and Procainamide

   c. Propranolol

   d. Atropine

   e. Diltiazem

   f. Epinephrine and norepinephrine

   g. Dopamine and dobutamine

   h. Amrinone

   i. Adenosine (Adenocard ®)

   j. Cardiac glycosides

   k. Nitroglycerin and nitroprusside

   l. Furosemide, Mannitol, Bumex, Diamox

   m. Sodium bicarbonate

   n. Calcium

o. Amiodarone

p. Labetalol

16. Estimate volume requirements in acute trauma, burns, and hemorrhage; and institute replacement therapy.

17. Control external blood loss.

18. Perform pulmonary artery catheterization, including determining catheter position by pressure wave recording and electrocardiogram (EKG).

19. Manage cardiogenic and septic shock.

20. Use pneumatic antishock garments.

PART B: SURGICAL CRITICAL CARE

COMPETENCY-BASED KNOWLEDGE OBJECTIVES:

Junior Level: PGY-I, PGY-II

Section One: Administration

1. Define and describe the role of the surgeon in the critical care setting to include these aspects:

a. Unit administration/management (surgeon as unit director)

(1) Triage of patients

(2) Economic concerns

(3) Data collection and computer usage

(4) Infection control and total quality management (TQM) issues

(5) Ethical concerns (consent, durable power of attorney, living wills)

(6) Local laws for referral to Medical Examiner

b. Management/consultation for specific surgical conditions

c. Coordination of multidisciplinary consultants relating and interpreting information between non-surgical consultants

2. Identify and outline criteria for admitting patients to the intensive care unit (ICU) to include:

a. Medical indications (related to specific diseases, e.g., pulmonary, cardiac, renal)

b. Surgical indications directly related to specific surgical illness

3. Identify and outline criteria for discharging patients from the ICU, to include:

a. Medical indications

b. Surgical indications

c. Patients unacceptable for ICU (e.g., futile care, do not resuscitate [DNR] orders)

4. Identify and explain the considerations surgeons must make when working with consultants in managing critical care situations.

5. Identify potential Organ, Tissue Donor candidates, as well as the hospital specific procedure for contacting families for potential donation.

Section Two: General Pathophysiology--Body as a Whole

1. Describe the normal physiologic response to a variety of insults such as sepsis, trauma, or surgery by associating the adaptation of the following systems from their pre-stress to post-stress states:

a. Respiratory

b. Hemodynamic

c. Renal

d. Metabolic

e. Endocrine

2. Describe the concept of the Systemic Inflammatory Response Syndrome (SIRS).

3. Describe prophylactic measures routinely used in critical care such as:

a. Gastrointestinal (GI) bleeding prophylaxis, including neutralizing, inhibitory compounds, and surface agents

b. Prophylactic antibiotics (demonstrate differences between true prophylaxis, empiric and therapeutic uses)

c. Pulmonary morbidity prophylaxis (incentive spirometry)

d. Prophylaxis against venous thromboembolic events

e. Aseptic technique

f. Universal precautions

g. Skin care protocols

h. Guidewire catheter changes for work-up of fever or change in clinical status

4. Discuss the pharmacotherapeutics of drugs used for support and treatment of the critically ill patient with emphasis on 1) mode of action, 2) physiologic effects, 3) spectrum of effects, 4) duration of action, 5) appropriate doses, 6) means of metabolism or excretion, 7) complications, and 8) cost:

a. Vasopressors

b. Vasodilators

c. Inotropic agents

d. Bronchodilators

e. Diuretics

f. Antibiotics/antifungal agents

(1) Distinguish between empiric, therapeutic, and prophylactic

(2) Demonstrate knowledge of classes of anti-infectives

g. Antidysrhythmics

h. Antihypertensives

Predict applicability of different classes in a particular situation:

(1) Use of beta blockers in hypertensive tachycardic patient

(2) Use of ace inhibitors in hypertensive patient with congestive heart failure

(3) Use of calcium channel blockers in hypertensive patient with angina

5. Outline the indications and methods for providing nutritional support by completing the following activities:

a. Discuss indications, selection of formulations, cost, route of administration of parenteral versus enteral forms of nutrition

b. Explain complications of parenteral and enteral routes of feeding as well as select methods to avoid the complications

c. Interpret findings associated with abnormalities in levels of glucose, chloride, sodium, phosphate, magnesium, trace metals/elements, and vitamins in the critically-ill patient receiving enteral or parenteral feedings; prepare recommendations for elderly patients under these same conditions

d. Estimate protein calorie requirements for patients of varying degrees of illness, and be able to analyze adequacy of nutritional support using commonly obtainable laboratory values

6. Outline the principles of postoperative fever with respect to causes, empiric diagnostic modalities, and specific therapy. How useful are these principles when considering the elderly patient?

7. Describe, apply, and revise appropriate treatment interventions based upon analysis of changes in the patient's clinical and laboratory parameters:

a. Adjustment of intravenous fluids with respect to expected stress response, including metabolic, hormonal, cardiovascular, and renal responses to replacement of fluid losses (Describe association between high levels of stress hormones and alterations of glucose metabolism remembering: do not volume resuscitate patients with excessive amounts of glucose.)

b. Efficacy of prophylactic measures for PE, stress ulceration and infection

c. Adequacy of nutritional support in a patient with multiple sites of protein losses (e.g., fistulas, drain sites, or metabolic stressors [infection, acute lung injury {ALI}, hyperthermia, respiratory failure])

d. Analysis and treatment of postoperative fever and methods of treatment

e. Events leading to and responsible for initiation of ventilatory support

f. Differentiate low cardiac output, hypotensive/hypertensive states in terms of preload, pump, or afterload

g. Analysis and treatment of seizures or acute change in mental status, including the role of:

(1) ABC's (airway, breathing, circulation); draw electrolytes/blood-urea-nitrogen (BUN)/ creatinine/glucose/calcium, magnesium

(2) Glucose/thiamine intravenously

(3) Evaluate medication record for new drugs or interactions (Ativan, Versed, phenobarbital, Dilantin [not applicable in the acute event])

h. Analysis and treatment of acute respiratory failure from changes in the airway, pump, or lung

8. Review the management and diagram a plan for the care of the critically ill surgical patient with multiple medical problems such as:

a. Cardiac dysrhythmias

b. Pulmonary insufficiency from airway, bellows (pump), or parenchymal problems

c. Acute/chronic renal failure with hemodynamic instability or need of specific fluid therapy (TPN), renal replacement therapy, high output GI fistulas

d. Diabetes mellitus and its special problems in the realm of nutritional support

e. Hemodynamic instability in the face of acute/chronic renal or pulmonary insufficiency

Section Three: Airway-Respiration

1. Describe the commonly used indications for initiation of ventilation support, including:

a. Indications and commonly acceptable values for initiation of mechanical ventilation

b. Evaluation of airway

c. Evaluation of adequacy of thoracic pump (muscle strength)

d. Evaluation of lung parenchymal characteristics (arterial blood gases and chest x-ray)

e. Analysis of commonly used pulmonary values (e.g., tidal volume [Vt], maximum ventilatory volume [MVV], compliance static and dynamic, functional residual capacity [FRC], PEEP, auto PEEP, airway pressures)

f. Indications and commonly acceptable values for weaning from mechanical ventilation

2. Review respiratory physiology, and describe the specific pathology involved in ventilation and perfusion deficits.

3. Discuss the association of airway obstruction with age, giving consideration to each of the following:

a. Repeated disruption of the balance of inflammatory mediators and humoral protection (elastase and antielastase, oxidant and antioxidant)

b. Neutrophil recruitment

c. Tissue repair culminating in flammatory lung destruction

d. Accumulated environmental oxidant injuries

4. Analyze and compare the principles of ventilator mechanics, including modes of ventilation, triggering mechanisms, and possible uses.

5. Describe the pathophysiology of acute lung injury (ALI, with spectrum from mild to severe ALI, also known as ARDS) and the management of the long-term ventilator-dependent patient to include:

a. Pneumonias (aspiration or nosocomial)

b. Acute renal failure

c. Cardiac failure

d. Prevention of malnutrition or restitution of body stores

e. Systemic Inflammatory Response syndrome (SIRS, MODS- Multiple Organ Dysfunction Syndrome the most severe form known as MSOF- Multi-System Organ Failure)

f. Sepsis

g. Skin care problems

h. Physical therapy (maintenance of muscle mass and function, prevention of contractions)

i. Psychological support for both patient and family

6. Review management of the following complex respiratory problems:

Mechanically ventilated patient with:

(1) Areas of differing compliance

(2) Bronchopleural or bronchoesophageal fistula

(3) Borderline cardiac reserve (non-compliant left ventricle, recent myocardial infarction, valvular dysfunction)

7. Explain why otherwise healthy elders may be more vulnerable to poor outcomes from diseases affecting diffusion (producing lower oxygen levels, e.g., pneumonia, COPD). Consider these factors in your explanation:

a. Heart rate

b. Ventilatory response to hypoxia

c. Ventilatory response to hypercapnia

8. Analyze the pros and cons of the use of the following drugs to improve respiratory function:

a. Bronchodilators (aerosols vs. parenteral medications)

b. Membrane stabilizing agents (cromolyn sodium, steroids)

c. Diuretics

d. Venodilators

e. Analgesics and sedatives

f. Mucolytics

Section Four: Circulation

1. Describe and compare the following cardiac function parameters:

a. Preload b. Afterload c. Myocardial contractility

2. Define the information obtained from the use of the following invasive/non-invasive monitoring devices. Specify: 1) which information is directly/indirectly measured or

calculated, 2) the accuracy and 3) cost of obtaining the information, and 4) review the hemodynamic principles associated with the use of each device:

a. Arterial catheters

b. Central venous catheters

c. Swan-Ganz catheters

d. Intracranial pressure monitors

e. End tidal carbon dioxide monitors

f. Pulse oximetry

g. Peripheral nerve stimulators (for testing adequacy of neuromuscular blockade)

h. Foley catheters

i. Intestinal pH monitors

j. Bioelectric impedance

3. Outline the protocols for definition of patterns and management of hemodynamically unstable patients, and analyze the selection of appropriate therapy by completing these activities:

a. Predict improvements in hemodynamic status with manipulation of definable variables, including fluid and drug therapies.

b. Detect and revise therapies based on the use of invasive/non-invasive monitoring devices.

4. Review cardiac function and hemodynamic monitoring from the following standpoints. Interpret changes in accuracy of values obtained from hemodynamic monitoring devices in:

a. Patients with severe pulmonary insufficiency who have low compliances or high PEEP

b. Patients with severe valvular insufficiency/stenosis

c. Various shock states (hypovolemic, septic, spinal, or cardiogenic)

d. High dose vasopressors

5. Summarize the effects of appropriate volume and drug therapies to manipulate the cardiovascular system in the following patients:

a. Hypovolemic hypotensive patient

b. Hypotensive euvolemic patient

c. Hypotensive hypervolemic patient

d. Hypotensive oliguric patient

e. Hypotensive, hypervolemic oliguric patient

f. Hypovolemic oliguric patient

g. Hypotensive, oliguric hypoxic patient

6. Discuss the significant patient characteristics in a geriatric population associated with increased risk of thromboembolic disease, including:

a. Underlying congestive heart failure

b. Prolonged immobility before surgery

c. Paralysis

d. Previous DVT

e. Hypercoagulable states (due to malignancy or coagulation factor deficiency)

Section Five: Renal

1. Review acid-base and electrolyte abnormalities common in critically-ill patients.

2. Identify, define, and classify the major categories of acid-base disturbance (metabolic acidosis and/or alkalosis, respiratory acidosis and/or alkalosis) in the context of the patient's altered physiology. Cite common clinical scenarios for their appearance:

a. Metabolic acidosis (hypovolemic shock, chloride excess resuscitation, occult ischemia)

b. Metabolic alkalosis (contraction alkalosis excessive diuretic use)

c. Respiratory acidosis

d. Respiratory alkalosis (early sign of sepsis vs. ventilator complication)

3. Discuss the identification and correction of complex acid-base problems such as choice of intravenous fluids for electrolyte replacement in the:

a. Hyperchloremic, metabolically-acidotic patient

b. Hypochloremic, metabolically-alkalotic patient

c. Stuporous, dehydrated, hyponatremic patient

d. Stuporous dehydrated hypernatremic patient

e. Patient with central diabetes insipidus

f. Hyponatremic, volume overloaded patient with carbon dioxide retention

Section Six: Neurologic

Describe the initial evaluation, ongoing, acute monitoring and long-term management of possible neurologic or behavioral abnormalities occurring in the ICU setting:

a. Seizures

b. Coma

c. Stroke

d. Multifactorial effects of "postoperative confusion"

e. Delirium

f. Brain death

Section Seven: Gastrointestinal/Hepatic

Discuss specific fluid compositions and the effect of the losses of such fluids as gastric, pancreatic, biliary, and succus entericus from intestinal fistulas of various levels. (Fluid should be described in terms of volume, electrolyte composition, and replacement fluid of choice.)

Senior Level: PGY-III, PGY-IV, PGY-V

Section Eight: Administration

1. Describe the criteria for predicting preoperatively the patient's need for critical care, including:

   a. Pre-existing disease states (cardiac, pulmonary, or renal)

   b. Operation-specific requirements for postoperative intensive care management

2. Review and interpret the relationships of physicians, nurses, and administrators in managing patients assigned to the ICU.

3. Discuss the value of an interdisciplinary approach to health care for the critically ill, elderly surgical patient. Include consideration of these groups/disciplines, working together:

a. Surgery

b. Nursing staff

c. Family-friends as caregivers

d. Physical therapy

e. Medical consultants

f. Pharmacy

g. Religion

h. Social work

i. Hospital administration

4. Identify new modes of intensive care therapeutics by completing the following activities:

   a. Predict and analyze the need for a new technology.

   b. Formulate a plan for the institution of new technologies or therapeutics.

   c. Critique and revise applicability of new technologies or therapeutics on a cost: benefit ratio.

5. Summarize the following moral and ethical problems encountered in the ICU:

   a. The need for organ donation and the identification of potential donors

   b. Decisions about whom to resuscitate and to what degree

   c. Care for the mentally incapacitated or incompetent patient

   d. Dealing with a difficult family and futility of care

e. Identifying and interacting with alternate religious/cultural beliefs

Section Nine: General Pathophysiology--Body as a Whole

1. Discuss the use of sepsis severity scores.

2. Distinguish between the major characteristics of septic shock and hypovolemic shock:

   a. Summarize initial evaluation and presentation

   b. Analyze therapeutic options

   c. Revise therapeutic options based on clinical parameters obtained from monitoring devices

3. Explain the concepts of tissue oxygen supply and demand. Demonstrate the contributions from the following components:

   a. Calculate oxygen delivery

   b. Calculate oxygen consumption

   c. Analyze the effect of cardiac output and varying preload, pump, and afterload to oxygen delivery

   d. Analyze the contributions of hemoglobin and percent of saturation on oxygen delivery

   e. Explain the changes in tissue oxygen delivery and uptake related to pH, temperature, 2, 3-diphosphoglyceride (DPG)

4. Discuss the evaluation and treatment of the following bleeding disorders:

   a. The role of blood vessels, platelets, fibrin cascade, and degeneration in normal hemostasis

   b. Disseminated intravascular coagulopathy (DIC), defining common causes and therapy

   c. Thrombocytopenia as a failure of production, accelerated destruction, or dilution

   d. Hemophilia A

   e. Von Willebrand's disease

f. Idiopathic thrombocytopenia purpura (ITP) and thrombotic thrombocytopenia purpura (TTP) as causes of thrombocytopenia (compare and contrast)

g. Heparin or Coumadin therapy misapplication

h. Advanced liver disease

i. The role of Protein C, S, and lupus circulating anticoagulant and their roles in bleeding disorders

5. Outline the unique problems of the following surgical subspecialties in critical care management:

a. Neurosurgery
b. Urology
c. Orthopedics
d. Pediatric surgery
e. Cardiac surgery
f. Thoracic surgery
g. Burns
h. Trauma

6. Discuss management of the overall hospital course of the patient with altered physiologic states:

a. Preoperative considerations specific to their disease

b. Operative considerations specific to their disease

c. Postoperative considerations specific to their disease

7. Outline the nutritional and metabolic components for a patient with specific disease states.

Section Ten: Renal

Discuss the physiologic principles and define specific management aspects associated with the following complex acid-base problems:

a. Renal tubular acidosis (differentiate between Type I and II)

b. Management of high output loss states from the gastrointestinal tract in a patient with poor cardiac function

c. Management of volume excess states associated with eunatremia or hyponatremia

Section Eleven: Gastrointestinal/Hepatic

Review and summarize the management of hepatic and renal failure, including:

a. Utility/disutility of disease-specific nutritional formulations

b. Adjustment or elimination of toxic substances (antibiotics, contrast material, narcotics)

c. Current means for support of renal failure, high dose diuretics, continuous veno-venous hemofiltration (CVVH), continuous veno-venous hemodialysis (CVVHD), dialysis (peritoneal and hemodialysis)

Section Twelve: Endocrine

Describe and specify therapy for the following endocrine-related problems associated with critical care:

a. Hypothyroidism/hyperthyroidism

b. Hyperparathyroidism/hypoparathyroidism (changes in calcium and magnesium values)

c. Adrenal cortical excess (Cushing's disease and syndrome)

d. Adrenal cortical deficiency states (Addison's disease)

COMPETENCY-BASED PERFORMANCE OBJECTIVES:

Junior Level: PGY-I, PGY-II

1. Provide initial evaluation and management of the critically-ill postoperative patient.

2. Institute the following therapeutic interventions:

   a. Manage fluid orders

   b. Determine ventilator settings

   c. Order pharmacologic support drugs

   d. Determine the need for and duration of antibiotic therapy

3. Obtain ACLS, FCCS, and ATLS certification.

4. Perform the following procedures:

    a. Orotracheal and nasotracheal intubation, nasogastric and bladder intubation

    b. Arterial catheter insertion

    c. Central venous and pulmonary artery catheter insertion

    d. Placement of tube thoracotomy

    e. Cricothyrotomy

    f. Pericardiocentesis

5. Serve on code and trauma team.

6. Manage critically ill patients in the intensive care unit:

    a. Determine need for ventilation and select situation appropriate airway and initial ventilator settings

    b. Compute initial and ongoing fluid requirements

    c. Analyze need for operative intervention

    d. Initiate rehabilitation process after stabilization of injuries, including:

        (1) Attention to possible altered body habitus

        (2) Requirements for special devices (physical, occupational, or speech therapy)

        (3) Maintain nutritional status

        (4) Provide support, interaction, and information for the family

    e. Establish intravenous access and maintain with appropriate sterile techniques for evaluation of fever

    f. Determine need for ongoing ICU management

    g. Identify appropriate antibiotic therapy distinguishing between prophylactic, empiric, and therapeutic uses

    h. Monitor hemodynamic data

Senior Level: PGY-III, PGY-IV, PGY-V

1. Direct all surgical management of patients in the ICU, including taking direct responsibility for admission and discharge.

2. Manage invasive monitoring catheters, interpret the data obtained, and manipulate the hemodynamic variables toward calculated goals.

3. Manage the following situations:

    a. Multiple organ system failure; providing support for failing, failed, or normal organs

    b. Life threatening surgical infections (e.g., ascending cholangitis, ascending myonecrosis or gangrene)

    c. Hypovolemic shock

    d. Renal failure

    e. Nutritional failure

    f. Liver failure

4. Place emergency transvenous/transthoracic access for cardiac pacing.

5. Perform emergency thoracotomy.

6. Manage the nutritional and metabolic components of the patient's illness.

7. Serve on code and trauma teams as a team leader.

8. Construct a caregiver assessment to include caregiver preparedness, needs, and signs of strain. Consider caregiver emotional support and actual physical care of the patient.

9. Analyze the special need for caregiver support systems when the patient is elderly.

EMERGENCY MEDICINE

COMPETENCY-BASED KNOWLEDGE OBJECTIVES:

Junior Level: PGY-I PGY-II

1. Complete the coursework and testing to obtain Basic and Advanced Cardiac Life Support (BLS and ACLS), Advanced and Trauma Life Support (ATLS), and Fundamental Critical Care Support (FCCS) certification.

2. Describe the initial management of the injured patient(s) in the following stages of care:

   a. Care in pre-hospital setting including BLS

   b. Triage in emergency department

   c. Serve as team leader and member during ATLS

   d. Coordinate patient transport to tertiary facility

3. Outline the basic principles of triage in the emergency department, including:

   a. Immediate treatment

   b. Ambulatory treatment

   c. Delayed treatment

   d. Expectant treatment

   e. Psychiatric considerations

4. Explain priorities for the diagnosis and/or assessment of illness/injury for patients presenting to the emergency department, keeping the following issues in mind:

   a. Discuss requests for diagnostic studies comparing the urgency of the need to know with:

      (1) The time required to obtain results

      (2) Potential danger to unstable patient

      (3) Quality of information obtained if a stat procedure compromises preparation of the patient

   b. Compare the need for provision of expedient, cost effective work-ups against the appropriateness of using the emergency setting for extensive work-ups at the risk of over utilizing limited resources.

5. Explain the ATLS protocol for the emergency resuscitation and stabilization of a seriously ill or injured patient:

a. Cite working knowledge of the ABC's of resuscitation

b. Define the essentials of AMPLE history (Allergy, Medications, Past illnesses, Last meal, Events of illness/injury)

c. Define the essentials of the Primary and Secondary Surveys

6. Describe the considerations for establishing an airway appropriate to the patient's condition, including:

a. Nasal trumpets/nasopharyngeal airway

b. Bag-mask assistance

c. Endotracheal tube

d. Surgically Created Airways (cricothyrotomy-needle or tube)

7. Describe the typical case scenarios for the following life-threatening problems requiring appropriate urgent/emergent action:

a. Multiple system trauma

b. Shock (cardiogenic, neurogenic, septic, and hypovolemic)

c. Traumatic neurological injuries

(1) Head injury without altered consciousness

(2) Head injury with altered consciousness, including deteriorating mental status

(3) Subarachnoid/subdural hemorrhage

(4) Penetrating head trauma

d. Chest injuries (penetrating and blunt)

e. Abdominal and pelvic injuries (penetrating and blunt)

f. Vascular injuries (penetrating and blunt)

g. Myocardial infarction

(1) Complicated (with congestive heart failure [CHF], hypotension, dysrhythmia)

(2) Uncomplicated

h. Pulmonary embolus

i. Diabetic ketoacidosis and other metabolic derangements

(1) Hyper- and hypo- kalemia

(2) Hyper- and hypo- natremia

(3) Hyper- and hypo- calcemia

j. Gastrointestinal bleeding

k. Pancreatitis

l. Ectopic pregnancy

m. Phlebitis

n. Burns, including inhalation injury

o. Poisoning

p. Hypothermia

8. Describe the principles of evaluation and management for the following less-serious problems:

a. Drug abuse and suicide attempts

b. Seizures/coma

c. Facial injuries

(1) Lacerations of face and scalp

(2) Fractures of facial bones and jaw

(3) Epistaxis

d. Pneumonia

e. Cardiac versus other chest pain

f. Acute abdominal pain

g. Hand injuries

h. Long bone fractures

9. Discuss the principles of evaluation and management for the following common minor problems:

a. Laceration evaluation

b. Tetanus prophylaxis

c. Wound treatment

d. Surgical repair of wounds

e. Appropriate dressings

f. Soft tissue infections

g. Headache

h. Eye, ear, nose, and throat infections

i. Bronchitis

j. Gastroenteritis

k. Hemorrhoids

l. Wildlife injuries (animal bites, insect and marine envenomations)

m. Follow-up instructions

10. Explain the indications and appropriate methods for:

a. Peritoneal lavage

b. Insertion of chest tubes

c. Pericardiocentesis

d. Suprapubic catheter insertion

e. Central line insertion

f. External/transvenous pacemaker placement

g. Cricothyrotomy

h. Rapid rewarming BAIR Hugger, CAVR (Continuous arterial venous rewarming)

11. Recommend ways in which the ED physical environment can be adapted to better meet the special needs of elderly patients. Discuss these problems:

a. Little privacy or confidentiality

b. Poor lighting

c. High ambient noise level

d. Lack of adequate communication and/or reassuring dialogue

12. Analyze the medicolegal responsibilities of the physician in the field as an accepting physician coordinating transport.

13. Define the requirements for informed consent in the emergency setting:

a. Life-threatening conditions

b. Minor surgery

c. Patients who are minors

d. Patients unable to provide informed consent (non compis mentis)

(1) Amnesia for event

(2) Drug or alcohol use

(3) Dementia

14. Summarize significant steps in the examination for and treatment of dental/oral emergencies with which a general surgeon should be familiar:

a. Toothache

b. Gingival bleeding (gingivitis, periodontitis, HIV-related hemorrhagic conditions)

c. Buccolingually displaced tooth or teeth

d. Dental or periodontal abscess or fistulous tract

e. Cellulitis, including Ludwig's Angina

f. Peritonsillar abscess (Quinsy)

Senior Level: PGY-III, PGY-IV, PGY-V

1. Outline the essential elements of a team approach to the management of life threatening illness or injury. Review responsibilities of the team leader and right- and left- side team members.

2. Describe the indications for emergency thoracotomy and the appropriate operative approach.

3. Analyze the decision process in evaluating the need for emergency operative intervention in trauma or disease.

4. Review, analyze, and design a hospital disaster plan that includes:

   a. Multiple victims

   b. Burns

   c. Radiation injury

   d. Chemical exposure

   e. Environmental injury

      (1) Immersion

      (2) Lightening strike

      (3) Hypothermia

      (4) Infections of epidemic proportions

5. Discuss the principles of advanced trauma care, including:

   a. Public education and outreach

   b. Emergency medical services management

   c. Public training in basic cardiopulmonary resuscitation (CPR)

6. Evaluate the functions of the leader of a multi-specialty team in emergency medicine.

7. Design a geriatric emergency care model that will foster optimal ED management and disposition.

COMPETENCY-BASED PERFORMANCE OBJECTIVES:

Junior Level: PGY-I, PGY-II

Under the guidance and supervision of more senior residents, attending surgeons, or emergency department attendings:

1. Perform triage of emergency trauma patients.

2. Establish emergency stabilization of the traumatized patient via the following precautions:

    a. Fracture management/stabilization

    b. Cervical spine protection

    c. Prevention of hypothermia

3. Assess patients presenting emergency conditions using the appropriate diagnostic protocol.

4. Prioritize requests for diagnostic studies based on need to know and the time required to obtain results.

5. Establish the following airways:

    a. Perform bag-mask ventilation

    b. Insert nasopharyngeal or oropharyngeal airways

    c. Perform endotracheal intubation (oro- and naso- pharyngeal)

    d. Perform a cricothyrotomy

6. Establish access to the central venous system.

7. Assist with acute resuscitation procedures as indicated.

8. Discuss patient's condition and future care with family.

9. Provide appropriate treatment for non-emergency problems presenting to the emergency department.

Under the guidance and supervision of senior residents, attending surgeons, or emergency department attendings:

1. Function as a surgical consultant, assessing and developing differential diagnoses and discussing recommendations with senior resident or attending.

2. Ascertain the severity of injury and identify patients requiring operative intervention.

3. Perform emergency diagnostic and therapeutic procedures such as:

   a. Peritoneal lavage

   b. Insertion of chest tubes

   c. Pericardiocentesis

   d. Suprapubic catheter insertion

   e. Central line insertion

   f. External/ transvenous pacemaker

   g. Insertion of intracranial pressure monitoring device

4. Perform minor surgical procedures such as:

   a. Drainage of abscesses
   b. Wound closure
   c. Removal of foreign bodies
   d. Wound debridement
   e. Bladder catheterization

5. Perform emergent dental procedures prior to referral to a dentist, oral surgeon, or maxillofacial prosthodontist, including:

   a. Examination and recommendation of palliative treatment for toothache

   b. Reinsertion of avulsed tooth

   c. Recognition and stabilization of fractured tooth/teeth

   d. Alleviation and/or prescription preparation for abscess or fistula

e. Diagnosing and immediately managing cellulitis, especially extending to the neck

6. Explain patient's condition and proposed therapy to his/her family and obtain appropriate informed consent.

7. Discuss management options with the patient and his/her family.

8. Recommend further diagnostic and/or radiographic studies to clarify diagnosis and focus patient management.

9. Communicate the importance of injury prevention to patients, patient families, and staff in the quest for control of trauma as a disease of modern society.

Senior Level: PGY-III, PGY-IV, PGY-V

Under the guidance and supervision of more senior residents, attending surgeons, or emergency department attendings:

1. Perform triage of several sets of multiply-traumatized patients (single victims) requiring in-hospital resuscitation or operative intervention.

2. Perform triage of several sets of multiply-traumatized patients (multiple victims) in the emergency care center.

3. Perform resuscitative thoracotomies as necessary.

4. Treat traumatized patients and perform needed operative repair.

5. Demonstrate the ability to perform as senior trauma leader in coordinating the patient's care, delegating duties to junior team members, and conferring with subspecialty consultants as needed.

6. Function as the multi-specialty team leader by coordinating timing and sequencing of operative interventions of the chest, abdomen, head, and orthopedic considerations.

7. Function with faculty in planning for disasters by performing the following:

a. Instruct ACLS, ATLS, and FCCS courses

b. Assist in the training of emergency medical service (EMS) personnel

c. Deliver community service lectures to citizens' groups

8. Demonstrate technical capability in advanced trauma care in the emergency department, intensive care units, and operating rooms.

9. Manage emergency services for an elderly patient, maximizing communication channels regarding:

a. History

b. Baseline cognitive and functional status

c. Presence of advance directives

d. Extent of work-up required

TRAUMA

COMPETENCY-BASED KNOWLEDGE OBJECTIVES:

Junior Level: PGY-I, PGY-II

1. Describe the anatomy, and physiology of all body systems affected by trauma, including the initial functional evaluation of the:

a. Central nervous system

b. Cardiovascular system

c. Pulmonary system

d. Gastrointestinal system

e. Genitourinary system

f. Extremity function

g. Nutritional status

2. Review the anatomy, physiology, and pathology applicable to the general management of trauma patients, including:

a. Central nervous system

b. Musculoskeletal system

c. Hand/forearm

d. Ear, nose, and throat

e. Ophthalmology

3. Outline the basic techniques of evaluation and resuscitation of trauma patients using the American College of Surgeons (ACS) Advanced Trauma Life Support (ATLS) protocol.

4. Specify the trauma services needed for initial evaluation and resuscitation in the hospital setting. Categorize appropriate pre-hospital or emergency medicine system levels of care.

5. Discuss wound care management in the emergency department and other settings. Outline the management of the following drains and tubes: nasogastric tube (NGT), urinary bladder catheter, chest tube (CT), central venous line (CVL), arterial line (AL).

6. Explain the characteristics of basic surgical skill, including:

   a. Sterile technique

   b. Incisions

   c. Wound closures

   d. Knot tying

   e. Handling of tissues

   f. Selection/use of operating instruments

   g. Universal precautions

7. Discuss the management of trauma involving the musculoskeletal system, including the need for casts, splints, and traction.

8. Summarize basic critical care management principles.

9. Analyze pharmacological support for trauma, resuscitation, and intensive care unit patients.

10. Identify the management principles for a trauma patient in the intensive care unit.

11. Outline the factors associated with rehabilitation as they apply to initial and early patient care.

12. Discuss the indications for, and the provision of, nutritional support for elderly patients sustaining trauma.

13. Outline the indications for such basic surgical procedures as:

a. Laparotomy

b. Debridement of injured tissues

c. Ultrasound

d. Medical antishock trousers (MAST)

e. HARE traction splint

f. Splinting

g. Diagnostic peritoneal lavage (DPL)

h. Thoracotomy/thoracostomy

i. Hemorrhage control

14. Discuss the primary causes/mechanisms of injury in the following list that contribute to making trauma the fifth leading cause of death in those aged 65 and older:

a. Falls

b. Motor vehicle crashes

c. Pedestrian injuries

d. Burns

e. Domestic abuse

Senior Level: PGY-III, PGY-IV, PGY-V

1. Explain trauma preventive measures, both medical and legal (e.g., the use of helmets and seat belts).

2. Describe and explain the mechanics/ballistics associated with various wounding agents.

3. Discuss the management of associated medical conditions seen in the trauma patient such as diabetes, chronic obstructive pulmonary disease, hypertension, coronary artery disease, and HIV.

4. Identify the indications for emergency operative procedures such as burr holes, cricothyrotomy, insertion of cardiopulmonary assist devices, and resuscitative thoracotomy.

5. Formulate a plan for rehabilitation to return the trauma patient to full functional life.

6. Define abdominal compartment syndrome. Describe how to measure intra-abdominal pressures and develop a treatment plan to treat abdominal compartment syndrome.

7. Define "Damage Control Surgery." Describe the sequence of damage control surgery in the treatment of the traumatized patient.

8. Analyze the transfer of a patient to an appropriate facility utilizing air medical services.

9. Discuss the availability and use of institutional and community support services for trauma patients such as social work, home health care, and vocation rehabilitation (physical and occupational therapy).

10. Discuss the management of a trauma service, including the training of its members in emergency medicine services, emergency department, operating room, intensive care, and rehabilitation.

11. Outline the economic impact of the following aspects of patient care:

    a. Vocational rehabilitation

    b. Nursing homes

    c. Insurance

    d. Diagnostic-related groups (DRG's) associated with management of trauma

    e. Billing and coding

    f. Managed care

COMPETENCY-BASED PERFORMANCE OBJECTIVES:

Junior Level: PGY-I, PGY-II

1. Complete an ACS ATLS course as a provider.

2. Participate in trauma evaluation, resuscitation, operative management, and intensive care unit (ICU) supervision of a multiply-injured patient.

3. Evaluate the patient to determine quality of emergency medical service (EMS) care.

4. Insert a variety of tubes:

   a. Endotracheal
   b. Thoracostomy
   c. Intravenous
   d. Intra-arterial
   e. Diagnostic peritoneal lavage(DPL)
   f. Urinary bladder catheter
   g. Nasogastric tube

5. Apply and remove all types of dressings and splints, including the vacuum pack dressing.

6. Make and close a variety of incisions and tie knots using sterile technique.

7. Evaluate critical care parameters and make decisions, under direct supervision, regarding change in care.

8. Direct the evaluation of an acutely-injured patient to include resuscitation and the decision for operation.

9. Assess nutritional needs and institute necessary nutritional support.

10. Formulate rehabilitation plans for trauma patients.

11. Monitor the trauma patient in the intensive care unit, suggesting changes in management as indicated.

12. Manage pharmacologic treatment plans for patients during resuscitation and in the critical care unit.

13. Perform basic surgical procedures such as:

   a. Laparotomy
   b. Wound debridement
   c. Application of traction devices for both head and extremities

Senior Level: PGY-III, PGY-IV, PGY-V

1. Coordinate EMS activities for initial trauma management to include instructional programs.

2. Manage penetrating wounds through understanding the injury potential of wounding mechanisms.

3. Provide management for pre-existing disease states in injured patients with appropriate consultation.

4. Perform all operative and management procedures for trauma to the chest, abdomen, extremities, and head with direct supervision.

5. Supervise central line placement, cricothyrotomy, CT, DPL, and ultrasound by junior housestaff.

6. Direct rehabilitation plans with appropriate consultation.

7. Organize hospital resources to provide services for trauma patients and direct patient flow in the emergency department, the operating room, and the intensive care unit.

8. Provide appropriate referrals for vocation rehabilitation, nursing home services, and physical rehabilitation.

9. Triage multiple trauma victims.

10. Practice the principles of damage control surgery in severely-injured patients.

GERIATRIC TRAUMA

COMPETENCY-BASED KNOWLEDGE OBJECTIVES:

Epidemiology of Elderly Patient Trauma

The resident will know the:

1. Demographics of the elderly population in the total population of the United States

2. Leading cause of injury death in the elderly population

3. Other major causes of injury death in the elderly population

4. Risk factors for trauma in older people

5. Increase in injury mortality in elderly people compared to younger cohorts

6. The cost of trauma care for elderly patients

Pathophysiology of Elderly Trauma Patients

The resident will be prepared to explain the:

1. Need for obtaining an accurate medical history

2. Impact of comorbidities on outcomes

3. Effects of various common medications on the elderly trauma patient

4. Concept of cerebral atrophy and possible delays in diagnosis of closed head injury (CHI)

5. Poor outcomes in severe CHI in elderly patients

6. Decreased pulmonary reserve in elderly people and the need for aggressive pulmonary care

7. Decreased cardiovascular reserve and the need for early and aggressive monitoring of the elderly trauma patient

8. Decreased renal function and the need for adjusting medication doses and volume resuscitation for this

9. Loss of bone mass in elderly people and the risk of severe injury with only minor impacts

10. High incidence of complications in the elderly trauma patients

11. Need for a thorough evaluation of the context of the injury and the pre-morbid condition of the patient

11. Rehabilitation of elderly trauma patients.

BURNS

COMPETENCY-BASED KNOWLEDGE OBJECTIVES:

1. Review the epidemiology, prevention, and socioeconomic and psychologic effects of burns.

2. Describe the histologic and functional anatomy of the skin, adnexa, and subcutaneous tissues.

3. Outline the physics and dynamics of thermal injury and the progression of tissue damage.

4. Assess the appearance of the burn wound in relation to its depth, bacteriologic condition, healing potential, and requirement for intervention.

5. Review the criteria for adequate evaluation of a burned patient, including historical aspects of the type of burn and subjective physical findings.

6. Discuss an initial treatment plan for stabilization and fluid resuscitation of a burned patient based on the above evaluation.

7. Describe the clinical factors necessitating immediate intervention to preserve life, limb, and function (PS of compartment syndrome).

8. Outline the principles of burn shock, immunologic alteration, and bacteriologic pathology of burned skin.

9. Define the "Rule of Nines" as it relates to total body surface area of the burn.

10. Describe the relationship between burn depth and the degree of the burn.

11. Review the basic principles and controversies concerning the management of the burn wound, and describe a clinical plan for its care.

12. Analyze the principles of systemic and local antibacterial agents in the burn wound.

13. Explain the special circumstances created by electrical, chemical, and inhalation burn injury, and apply their relation to the management.

14. Describe the pathology and management of inhalation injury, noting its relation to mortality, morbidity, and time course of patient recovery.

15. Explain the etiology and treatment of carbon monoxide poisoning.

16. Discuss the physics and pathology of the electrical burn and its relation to associated organ injury, including:

a. Current

d. Neurological injury

b. Entrance and exit wounds
e. Vascular problems

c. Deep tissue involvement
f. Rhabdomyolysis

17. Review the indications for and contributions of physical and occupational therapy.

18. Describe the anatomy of the hand in relation to the specialized requirements of management and rehabilitation of the burned hand.

19. Describe the indications, techniques for harvest, application, immobilization, and care of split- and full- thickness skin grafts.

20. Explain the principles of wound contracture, and report desirable and harmful effects of contracture on:

a. Initial management of the burn victim

b. Closure of the burn wound

c. Rehabilitation of the burn patient

21. Describe and explain the following terms:

a. Compartment syndromes

b. Burn eschar contraction

c. Fasciotomy and escharotomy incisions and techniques

22. Summarize the treatment of chemical burns to include pathology, sources, decontamination, and management.

23. Review and analyze the special circumstances, management, and rehabilitation of burns in the pediatric patient.

24. Describe the indications for, and basic techniques of, plastic and reconstructive intervention in the burn wound to alleviate:

a. Scar contracture

b. Underlying joint contracture

c. Hypertrophic scar

25. Summarize the activities of a specialized burn team or unit in the overall management of the burn patient to include the following:

a. Physical therapy
b. Occupational therapy
c. Psychological counseling
d. Recreational therapy
e. Burn nursing
f. Cosmetics

COMPETENCY-BASED PERFORMANCE OBJECTIVES:

1. Provide emergency burn patient evaluation and monitoring.
2. Determine the level of care and need for transfer to a burn facility.
3. Estimate the depth and percent body surface area of burns.
4. Implement fluid resuscitation protocols for children and adults.
5. Select and apply appropriate dressings and topical antibacterials.
6. Manage systemic effects of the burn wound in the critically injured surgical patient, considering:
    a. Sepsis
    b. Gastrointestinal (GI) effects
    c. Immunologic problems
    d. Cardio-respiratory effects
    e. Abdominal compartment syndrome
7. Manage treatment of inhalation injury:
    a. Flexible laryngotracheoscopy
    b. Ventilator management
8. Manage carbon monoxide poisoning.
9. Manage wound therapy, including:
    a. Eschar formation and slough

b. Re-epithelization

c. Tangential and fascial excision

d. Debridement of deep tissues

e. Skin graft harvest and application

10. Evaluate electrical burns, including:

a. Entrance and exit wound

b. Cardiac, vascular, neurologic, ophthalmologic effects

c. Deep tissue destruction

d. Rhabdomyolysis

11. Institute treatment of chemical burns, including:

a. Identification of types and sources

b. Management by dilution or neutralization

c. Treatment of systemic effects of local chemicals

12. Manage eschar contracture and edema control:

a. Techniques of escharotomy

b. Techniques of fasciotomy

13. Manage the treatment of the burned child, including initial therapy, systemic support, and special care needs with input from the pediatric intensive care team, including child abuse.

14. Direct clinical management and supervision of the burn team.

GERIATRIC BURNS

Competency-Based Knowledge Objectives:

1. Describe the age-related changes in the anatomy and functional characteristics of the skin and adnexa.

2. Define the extent and depth of thermal injury as a percent of the body surface injured, and use specific anatomical terms to describe the depth of injury.

3. Discuss the fluid resuscitation and clinical stabilization of the elderly burn patient as a function of the above description of the burn wound.

4. Define and describe fluid shifts and physiologic derangements associated with the burn injury as a function of age.

5. Describe the management of the burn wound including the use of topical antimicrobial agents, biologic dressings, and skin grafts in the elderly burn patient.

6. Review the special problems of electrical, chemical, and drug- related injury to the skin.

7. Describe the morbidity and mortality rates in elderly burn patients and the impact of inhalation injury on these rates.

8. Review the epidemiology and socioeconomic factors associated with burn injuries in the elderly patient.

9. Describe the prevention of burn injuries in elderly patients.

10. Describe the physiologic changes and limitations that occur as aging progresses.

11. Describe the role of the multidisciplinary team in the support and rehabilitation of the elderly burn patient.

12. Describe the techniques and indications for skin grafting using spit and full thickness grafts from elderly and atrophic skin.

13. Outline the factors in withholding or withdrawing care in geriatric burn patients.