



University of Illinois, Metropolitan Group Hospitals Program in General Surgery

Rotation Title: Trauma/Critical Care - Lutheran General Hospital

Level of Training: PGY II

Attending in Charge of Rotation: Dr. Manoj Shah

Faculty: Dr M. Shah, Dr. D. Resnick, Dr. Dr. S. Nikolich, Dr. Marinov

Rotation Description:

LGH is a level one trauma center located in the suburb of Park Ridge. The majority of the trauma patients there are due to blunt trauma, with an occasional penetrating injury. The ER at LGH is new, and has three trauma bays that can also function as OR suites in the event of a critically ill trauma patient needing emergency measures in the ER.

The second year resident works directly with the trauma attending in all the trauma's and is also responsible for the care of all the ICU trauma patients including SICU, MICU, SICC, and CCU (if trauma patients are being placed/admitted in the latter three units). At night there is a PGY V in house that serves as the trauma attending. If there is a PGY IV on call then there will also be a trauma attending in house. There will be 10-15 trauma cases that you will do, but most of these will be tracheostomy's and Gastrostomy tubes on the patients that have been in the ICU for a prolonged period of time. The resident is given a lot of autonomy but along with it comes a lot of responsibility. There is no time when the resident is left without supervision. While on this rotation the PGY II is NOT allowed to take a vacation. It's a demanding rotation but there is a tremendous amount of learning that occurs in the two months. Sometimes, a first year surgical resident could be working with second year resident and first year resident may follow less complicated ICU patient.

Assessment:

Monitoring of the accomplishment of the stated objectives will be performed using the following methods:

1. 360 degree evaluation: End of rotation assessment of resident's performance with respect to

the stated objectives by faculty, nurses, fellow residents, patients and medical students.

2. Case Logs: auditing of operative cases pertinent to the specialty in the Surgical Operative Log.
3. Written Examination: performance on the annual ABSITE examination section on Trauma and Critical Care.
4. Complete the coursework and testing to obtain basic and advanced cardiac life support and fundamental critical care support certification. ATLS.

SURGICAL SKILLS ADVANCEMENT:

The resident will exhibit surgical performance skills based on the following guidelines:

1. By the end of the rotation, have completed (per necessity) the OSAT/OSCA for the following procedures:
 - a. PGY 2: Ventilator management, Percutaneous tracheostomy, G tube placement

COMPETENCY-BASED LEARNING OBJECTIVES

Patient Care

1. Perform a complete and thorough primary and secondary survey with adjunctive studies with emphasis in elements unique to Trauma and Critical Care Patients.
2. Initiate the laboratory evaluation and any other initial diagnostic studies with an understanding of the tests to be ordered.
3. Make informed decisions about diagnostic and therapeutic interventions on Trauma/Critical Care surgery patients with the guidance of senior residents and faculty.
4. Be proficient in the preoperative preparation of Trauma patients for Trauma surgery and routine postoperative care.
5. Understand basic pathophysiology pertinent to Trauma/Critical Care patients and begin to master the skills necessary for care for the ICU patient under the guidance of the senior residents and faculty members.
6. Understand basic pathophysiology and principles of resuscitation.
7. Understand the basic indications for common radiological and interventional studies used in the care of Trauma patients such as plain chest, CT scans, angiography...
8. Demonstrate the ability to effectively set priorities and coordinate the care of

Trauma and Critical Care patients.

9. Physical Examination: Exhibit proficiency in performing a systematic physical exam of the entire body with emphasis on positive findings as well as pertinent negative findings.

Medical Knowledge

Trauma

1. Define the categories of shock based upon type, and 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.
3. Propose an algorithm for diagnosing and initiating treatment for each shock type.
4. Discuss the pathophysiology, including the mechanism of arrest, for each of the following situations:
 - a. Acute myocardial infarction
 - b. Suffocation
 - c. Acute dysrhythmia
 - d. Drowning
 - e. Congestive heart failure
 - f. Hypothermia
 - g. Pulmonary embolus
 - h. Electrical injury
 - i. Tension pneumothorax
 - j. Acute stroke
 - k. Penetrating or blunt trauma
 - l. Burns
 - m. Substance abuse
5. Outline the signs and symptoms of acute airway obstruction and define the appropriate intervention in adult and pediatric patients.
6. Outline the surgical housestaff role on the "code team." Know how the code is run. Be familiar with all aspects of a "code yellow".

7. Analyze methods for initiating and maintaining ventilatory support. Know the indications for intubation.
8. Explain the etiology and treatment of carbon monoxide poisoning.
9. Describe the indications and potential complications for the following surgical interventions:
 - a. Central venous catheter
 - b. Swan Ganz catheter
 - c. Arterial line
 - d. Thoracostomy tube
 - e. Peripheral vein cutdown
 - f. Pericardiocentesis
 - g. Thoracentesis
 - h. Endotracheal intubation (oral and nasal)
 - i. Resuscitative thoracotomy
 - j. Diagnostic peritoneal lavage (DPL)
 - k. Cricothyrotomy
10. Review the importance of serial physical examinations, hemodynamic monitoring, and serial laboratory evaluations in assessing patient response to specific resuscitation treatment.
11. Outline the clinical and laboratory indications for transfusion of the following blood products:
 - a. Packed red cells
 - b. Cryoprecipitate
 - c. Fresh frozen plasma
 - d. Whole blood
 - e. Platelets
 - f. Specific clotting factor concentrates (VIII, IX, XII)
12. Analyze the potential complications from use of the above products.
13. Elderly 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 elderly.
14. Describe the role and indications (if any) for the following products in acute resuscitation:
 - a. Desmopressin acetate (DDAVP)
 - b. Hespan and similar products
 - c. Albumin
15. Assess the indications, guidelines, and potential complications of the following cardiovascular drugs:

- a. Dopamine
- b. Dobutamine
- c. Phenylephrine
- d. Epinephrine
- e. Norepinephrine
- f. Amrinone

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

17. Diagnose cardiac arrest and rhythm disturbances.

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

- a. Morphine
- b. Lidocaine and Procainamide
- c. Bretylium
- d. Propranolol
- e. Atropine
- f. Isoproterenol
- g. Verapamil
- h. Epinephrine and norepinephrine
- i. Dopamine and dobutamine
- j. Amrinone
- k. Calcium
- l. Cardiac glycosides
- m. Nitroglycerin and nitroprusside
- n. Furosemide
- o. Sodium bicarbonate
- p. Adenosine (Adenocard ®)

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

20. Control external blood loss.

21. Use pneumatic antishock garments.

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

23. Perform endotracheal and nasotracheal intubation.

24. Perform cricothyrotomy and tracheostomy.

25. Manage mechanical ventilatory equipment. Know and understand different modes of ventilation.

26. Perform pulmonary artery catheterization, including determining catheter position by pressure wave recording and electrocardiogram (EKG).
27. Treat neurogenic shock.
28. Manage cardiogenic and septic shock.
29. Manage flail chest.
30. Manage the unconscious patient.
31. Manage carbon monoxide poisoning.

Surgical Critical Care

Global Objectives: Demonstrate knowledge of the principles associated with the diagnosis and management of critically-ill patients, including knowledge of simple and complex multiple organ system normalities and abnormalities.

Demonstrate the ability to appropriately diagnose and treat patients with interrelated system disorders in the intensive care unit.

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)
 - 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.

General Pathophysiology

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. Metabolic
 - c. Hemodynamic
 - d. Endocrine
 - e. Renal
2. 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
3. Discuss the pharmacotherapeutics of drugs used for support and treatment of the critically ill patient with emphasis
 - 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

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

5. 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
 - 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
- Anti-epileptic drugs (Valium, phenobarbital, Dilantin)

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

7. 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)
- 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

8. Describe the commonly used indications for initiation of ventilation support,

9. 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)

10. Recognize commonly acceptable values for weaning from mechanical ventilation

11. Review respiratory physiology, and describe the specific pathology involved in ventilation and perfusion deficits. Discuss the association of airway obstruction with age, giving consideration to each of the following:

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

13. Describe the pathophysiology of acute lung injury (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 (SRI, formerly Multiple Organ Dysfunction syndrome MODS or MSOF)
- f. Sepsis
- g. Skin care problems
- h. Physical therapy (maintenance of muscle mass and function)
- i. Psychological support for both patient and family

14. 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)

15. Explain why otherwise healthy elders may be more vulnerable to poor outcomes from diseases 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

16. 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

Circulation

1. Describe and compare the following cardiac function parameters:

- a. Preload

- b. Myocardial contractility
 - c. Afterload
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
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)
5. 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)

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
 - c. Respiratory acidosis

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. Patient with central diabetes insipidus
 - e. Hyponatremia, volume overloaded patient with carbon dioxide retention

4. 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

Neurologic

1. 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. Multifactor effects of “postoperative confusion”
 - e. Delirium
 - f. Brain death

Gastrointestinal/Hepatic

1. 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.)

Pulmonary

1. Discuss the use of sepsis severity scores.

2. 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)

3. 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

4. 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

Gastrointestinal/Hepatic

1. 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)

Endocrine

1. 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)

Practice Based and Life Long Learning:

1. Develop a personal program of self-study and professional growth with guidance from the teaching staff and senior residents. An understanding of the etiology, pathogenesis, pathophysiology, diagnosis and management of oncologic and general surgery disorders will allow for sound surgical judgment, which relies on knowledge, rational thinking and the surgical literature.
2. Utilize current literature resources to obtain up-to-date information in the oncologic and general surgery patients and practice evidence-based medicine.
3. Participate in teaching and organization of the educational weekly conferences.
4. Participate in activities of the Department of Surgery (including all teaching conferences) and assume responsibility for teaching and supervision of subordinate surgical house staff, and medical students.
5. Participate in the Department Morbidity & Mortality conference and utilize information to further improve patient care.
6. Participate in daily teaching rounds and be able to present patients in an organized and complete fashion
7. Topic of the day in the computerized life long learning portfolio

Systems Based Practice

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. Hospital administration | e. Pharmacy |
| b. Nursing staff | f. Religion |
| c. Family-friends as caregivers | g. Social work |
| d. Physical therapy | h. Surgery |
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

Interpersonal and Communication Skills

1. Demonstrate interpersonal and communication skills that result in the effective exchange of information pertinent to patient care with patients, their families, and health professionals
2. Work effectively as a member or leader of a health care team or other professional
3. Work in a consultative role to other physicians and health professionals; and,
4. Maintain comprehensive, timely, and legible medical records, if applicable.

Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Residents are expected to demonstrate:

1. Compassion, integrity, and respect for others
2. Responsiveness to patient needs that supersedes self-interest
3. Respect for patient privacy and autonomy

4. Accountability to patients, society and the profession
5. Sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation.

[as further specified by the ACGME]

Systems-based Practice

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.

Residents are expected to:

1. Work effectively in various health care delivery settings and systems relevant to their clinical specialty
2. Coordinate patient care within the health care system relevant to their clinical specialty
3. Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population-based care as appropriate
4. Advocate for quality patient care and optimal patient care systems;
5. Work in interprofessional teams to enhance patient safety and improve patient care quality
6. Participate in identifying system errors and implementing potential systems solutions.

[as further specified by the ACGME]

READING MATERIALS:

Educational materials which will function as guides for resident education during this course include but are not limited to:

1. The SCORE General Surgery Resident Curriculum Portal accessed at <https://portal.surgicalcore.org/home>
2. Schwartz's Principles of Surgery
3. Zollinger's Atlas of Surgical Operations
4. The Surgical Core Curriculum accessed via Access Surgery through the University of Illinois-Chicago website

OUTCOMES:

Outcomes for the various goals and procedures in this curriculum will be assessed along the following standards:

1. Superior: the resident exhibits conceptual understanding beyond that which is described in this bulletin, and practice performance which is at a standard for a resident at a more advanced PGY year.
2. Above-Average: the resident has shown understanding and performance that is above what is expected for the rotation.
3. Competent: the resident exhibits conceptual understanding and practice based performance standards that are minimal, for the appropriate PGY year, for advancing towards general surgical practice.
4. In Need of Remediation: the resident has failed to grasp the basic concepts and practices necessary to advance past this rotation for the PGY year, and shows need of repeating or training augmentation.