



SERVICE: Surgical Critical Care – Boca Raton Regional Hospital, PGY 2

General description:
<p>The FAU surgical residents will rotate in the [Surgical] Intensive Care Unit at Boca Raton Hospital during their 2nd clinical year. The total duration of this rotation is 8 weeks, in addition there may be a 4 rotation in the PGY 3 year.</p> <p>The resident will be a fully integrated member of the [S]ICU team, under the supervision of the [S]ICU attending staff, and will be collaborating with experienced [S]ICU mid-level provider(s), nurses and ancillary providers in a multi-disciplinary care setting. The surgical residents will participate in all care rendered to the [S]ICU patients at Boca Raton Regional Hospital: admission, diagnostic work-up, procedures, post-operative care, and discharge.</p> <p>There will be <u>daily morning rounds</u> where the resident (and/or mid-level provider) who was on call the previous night presents the patients to the [S]ICU attending and multidisciplinary [S]ICU team. The resident will be given the opportunity to present important patient data, make and prioritize diagnoses, and deliberate a plan of action for the day. This plan of action, under leadership of the [S]ICU attending, will then be discussed with the members of the team and modified as necessary. The [S]ICU attending will incorporate bedside teaching applicable to specific patients / problems during morning rounds. After morning rounds, the resident will carry out the determined plan of action for each patient assigned to him/her, evaluate and admit new patients to the [S]ICU, as assigned, reevaluate the current patients as indicated, and oversee the transfer of his/her patients from the ICU to lower levels of care. Throughout the day, the resident will perform ICU-related procedures as outlined in the patient care competency, under the supervision of the [S]ICU attending and/or other designated expert ICU personnel. Prior to <u>afternoon rounds</u>, the resident will gather the results of pertinent studies, laboratory tests, etc. and evaluate the patients together with the [S]ICU attending on rounds. A plan of action for the night will be elaborated for each patient. In case of high unit acuity or specific “problem patients” the chief surgical resident[s] on call will join afternoon rounds to become familiar with the patients as well. In addition to the senior/chief resident on call, an ICU attending is on in-house call and will directly supervise the [S]ICU resident throughout the night.</p> <p>The surgical residents will attend the following educational activities:</p> <p>Surgery Core/specialty curriculum and Resident Lectures - 2 hours/week</p> <p>Surgery M&M - 1 hours/week</p> <p>Educational activities related to the Practice/Rotation:</p> <p>Critical care core curriculum and review of landmark literature - 2 hours, at least once a week</p>

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Competencies:	Goals and Objectives:
Patient Care:	<p><u>Goals:</u></p> <p>During this rotation, the resident should learn and practice to:</p> <ul style="list-style-type: none"> ▪ Demonstrate caring and respectful behaviors when interacting with patients and their families; demonstrate sensitivity to gender, age, ethnicity, religion, value systems and

other potential differences of patients and their families; practice according to the clinical standards of Boca Raton Regional Hospital

- Gather patient and case specific essential, **comprehensive multi-source and accurate information** about their patients for initial or peri-operative work-up and patient follow-up in the inpatient setting
- Using all available resources, under the guidance by the [S]ICU attending, make **informed decisions about diagnostic and therapeutic interventions** based on patient information, up-to-date scientific evidence and clinical judgment; evaluate and implement priorities in patient care and incorporate preventive measures
- Under the guidance of the [S]ICU attending and in collaboration with other designated [S]ICU expert personnel, develop and **carry out patient management plans**
- Under the guidance of the [S]ICU attending and in collaboration with other designated [S]ICU expert personnel **monitor** closely the patients clinical progress, review and react to variances in patient progress or response to therapeutic interventions; **Communicate** the details and changes of patient care, progress and complications to the [S]ICU attending in a timely manner
- Under close and direct supervision by the [S]ICU attending **counsel and educate patients** and their families on the state of the patient's disease, necessary diagnostic tests, operative procedures medical management
- Use information technology (hospital computer system) to support patient care decisions and patient education (electronic patient record, electronic radiology studies, online educational resources, including literature research)
- **Work closely with other healthcare professionals**, including those from other disciplines (Nephrology, Endocrinology, Cardiology, Pulmonology, Critical Care pharmacist and nutritionist, respiratory therapy, mid-level providers, nurses, [S]ICU office taff, etc.), to provide patient-focused and optimum outcome driven care
- Ensure that the **needs of the patient and team supersede individual preferences** when managing patient care; incorporate evidence-based medicine into patient care whenever possible; comply with changes in clinical practice and standards given by the [S]ICU attending

Objectives:

During the rotation, the resident should:

- Under one-on-one supervision by the [S]ICU attending, **perform competently and/or assist in procedures** (both in the inpatient and outpatient setting) **considered essential for the area of practice**, including:
 - a. **arterial lines** (radial, femoral, +/- brachial), **central venous catheters** (internal jugular, subclavian, femoral - for monitoring, nutrition, hemodialysis), **pulmonary**

	<p>artery catheters</p> <p>b. endotracheal intubation (oral, +/- nasal), tracheostomy</p> <p>c. bronchoscopy</p> <p>d. gastroduodenoscopy and percutaneous endoscopic gastrostomy</p> <p>e. complex dressing changes (abdomen, soft tissue wounds, etc.) under anesthesia</p> <p>f. bedside ultrasonography [for diagnosis of fluid or air in pleural space, fluid in abdomen, gallbladder disease, pericardial fluid and assessment of cardiac function, arterial and venous catheter placement, urinary retention, other]</p> <ul style="list-style-type: none"> ▪ Under supervision by the [S]ICU attending and in collaboration with experienced [S]ICU mid-level provider(s), participate in the pre- and post-operative surgical management of severely ill patients with and without multiple organ failure; participate in daily morning and afternoon patient rounds on the [S]ICU service at Boca Raton Regional Hospital <ul style="list-style-type: none"> a. Complete (or have completed) and pass(ed) Advanced Cardiac Life Support (ACLS), Advanced Trauma Life Support (ATLS), and Fundamentals of Critical Care Support (FCCS) training b. Serve on the code team and the trauma team for initial resuscitations; Diagnose cardiac arrest and rhythm disturbances; apply closed chest cardiac massage (CPR); perform closed chest defibrillation c. Recognize and manage airway obstruction; perform endotracheal and nasotracheal intubation; Perform cricothyrotomy and tracheostomy; Manage mechanical ventilator d. Determine the indication, dosage, contraindications, and method of administration of the medications commonly required in the therapy of critically ill patients (see ICU pharmacology) in individual patients and clinical situations e. Perform pulmonary artery catheterization, including determining catheter position by pressure wave recording and electrocardiographic monitoring and chest film f. Manage cardiogenic and distributive and obstructive shock; control external blood loss ▪ Under supervision by the [S]ICU attendings and in collaboration with experienced [S]ICU mid-level provider(s) manage post-operative surgical complications, including wound and systemic infection, SIRS, sepsis and organ failures(s), bleeding, and death and the dying patient ▪ Attend [S]ICU didactic lectures and literature review sessions at least 85% of the time
<p>Medical Knowledge:</p>	<p><u>Goals:</u></p> <p>Residents must demonstrate knowledge about established and evolving biomedical,</p>

clinical and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care.

Objectives:

At the end of the [S]ICU rotation, the resident should be able to understand the concerns and principles of management for patients with severe illness (related to comorbidities, the acute disease process and post-operative complications) in the peri-operative period. The resident should be able to assess the level of care and monitoring needed for any given patient and which patient will require admission to the surgical intensive care unit. The resident should understand the complexities of single and multiple organ dysfunctions and their management and the protocol-driven, multi-specialist approach to minimize complication related to critical illness.

▪ Administration

- a. Describe the **criteria for predicting pre-operatively the patient's need** for critical care, including:
 - Pre-existing disease states (cardiac, pulmonary, hepatic or renal, etc.)
 - Operation-specific requirements for post-operative intensive care management
- b. Review and interpret the relationship of physicians, nurses, mid-level providers, specialists and administrators in managing patients assigned to the ICU
- c. Discuss the **value of an interdisciplinary approach** to health care for the critically ill surgical patient in an open, intensivist driven unit. Include consideration of these groups/disciplines, working together:
 - Surgery and surgical specialty "primary" providers
 - ICU nursing staff
 - Critical care pharmacist
 - Nutritionist
 - Physical therapy, occupational therapy
 - Medical consultants (Medicine, Cardiology, Nephrology, Endocrinology, Pulmonology, Infectious Disease, Neurology, etc.)
 - Religious support staff, social work, case management
 - Unit and Hospital administration
 - Family and friends as caregivers and support
 - Transplant Resource Center
- d. Understand the **principles of scarce resources and costs associated with ICU care** and with inappropriate allocation of level of care (over-and-under allocation)

▪ The patient as a human being

- a. Understand the **psycho-social issues associated with critical illness** and temporary or permanent loss of self-control in the ICU, i.e., inability or limitation to communicate; immobility; inability to take care of own affairs; issues of dignity

	<ul style="list-style-type: none">b. Understand that psycho-social and physical effects can persist after (successful) discharge from the ICU and hospital for a prolonged period of time and/or permanently (prolonged rehabilitation, disability, cognitive and mood disturbances, etc.)c. Care for the mentally incapacitated or the incompetent patient:<ul style="list-style-type: none">- Understand the effects of pain, medications, critical illness and disruption of normalcy/bio-rhythm on the patient’s capacity to understand complex issues/concepts, and make sound medical decisions- Understand the evaluation of competency and proper use of surrogates (family, friends, guardians) and the concept and limitations of the healthcare power of attorney for medical decision-making/informed consent in ICU patientsd. Understand the need for support by family and friends and the psychosocial and economical stress these individuals are exposed toe. Understand the influences of cultural, ethnic and religious beliefs with regard to decision-making for supportive and end-of-life caref. Understand the need for comprehensive, patient/family adjusted regular communication on patient status, progress, planned procedures, prognosis, available support services, etc.g. Dealing with a “difficult” family: Understand that physician transference/counter transference; insufficient or divergent communication; and insensitivity to the patient/family’s cultural, ethnic and religious needs and insufficient non-medical family support may be the root cause <p>▪ End-of-life care</p> <ul style="list-style-type: none">a. Understand the concepts of futility of care, brain death, (persistent) vegetative state and evidence-driven prognosisb. Understand the concepts and limitations of advanced directivesc. Understand the difference and options for supportive care (full/limited), comfort care and withdrawal of care<ul style="list-style-type: none">- Pain management +/- sedation- (removal of) Fluid and nutritional support- (removal of) Ventilator support- “Non medical” support (social work, psychology, religious, privacy, etc.)d. Understand the meaning and options for DNR (Do Not Resuscitate) and DNI (Do Not Intubate) orders; understand the published outcomes (survival, neurologic) with cardio-pulmonary resuscitation in critically ill patients; understand the influences that cultural, ethnic and religious beliefs have on such decisionse. Understand the concepts involved with organ and tissue donation:
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- Current state of organ donation in the State of Maryland / United States
- Physician vs. Transplant Resource Specialist approach of the family
- Brain death vs. non-heart-beating donor
- Exclusion criteria for organ and/or tissue donation
- Evaluation process of the prospective donor and ICU “organ” supportive care
- **ICU patient evaluation**
 - Understand, perform and document the critical elements of a **comprehensive history** to include all comorbidities and prior results of workup (PFTs, EKG, ECHO, cardiac catheterization, stress testing, laboratory data, etc.), prior medications and dosage, allergies, etc.)
 - Understand the importance of **communication of operative details** (length of OR, what [exactly] was done, blood loss, blood products and fluid therapy, anesthetics used, any complications, etc.
 - Understand, perform and document the critical elements of a **comprehensive and organ specific physical examination**
 - Assess, document and communicate **differential diagnoses**, their (potential) interaction and resultant need for monitoring, management and overall level of care
- **Severity of illness scoring**
 - Understand the concepts and limitations behind the major severity of illness and organ dysfunction scores (SOFA, APACHE, MODS, SIRS, ISS, RTA, etc.)
 - Use scoring (over time) in conjunction with other data to predict patient outcomes
 - Understand concept of benchmarking against collective data to assess unit performance and improvement measures (APACHE, Project Impact, NNIS, etc.)
- **Organ assessment and management of organ failure(s)**
 - **Heart and vascular system**
 - Understand the **anatomy and physiology of the heart and vascular system** and its adaptation/failure in response to volume alteration, inflammatory mediators, cardiovascular drugs and ischemia
 - Myocardial function and afterload (Frank Starling mechanism, electromechanical coupling, ventriculo-arterial coupling), hemoglobin and percent saturation, changes in pH, temperature, 2,3-diphosphoglyceride (DPG), etc.
 - Oxygen consumption: normal body and tissue demands for blood flow,

oxygen uptake (extraction ratio) and CO₂ production, RQ-concept, changes in metabolic demand due to temperature, hormones/mediators, etc.

- Understand the **cardiac performance changes** with ischemia (stunned myocardium, infarct), severe acidosis, sepsis, valvular dysfunction (AS, AI, MS, MI, TR), pulmonary hypertension, chronic dilatation, etc.
- Understand the effects of inflammatory mediators, ischemia, catecholamines on the pulmonary and **systemic vasculature** (different physiologic regions); understand the concept of **auto regulation** in certain vascular beds
- Understand the various **non-invasive and invasive cardiovascular monitoring** techniques and their limitations: clinical exam, NIBP, arterial line, CVP, pulmonary artery catheter (PAP, PCVW, CO, SV, SVR), ABG, S_vO₂, lactate and base deficit, urine output, etc.; define the information obtained from the use of these devices and 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
- Understand the influence of major cardiovascular active medications on the heart, vasculature and perfusion (see ICU pharmacology)
- Understand the **definition and grading of (congestive) heart failure**, its major etiologies and effect on acute and long-term outcomes in critically ill patients; understand the link of cardiac failure to other organ failure
- Discuss the common etiologies of **pulmonary hypertension**, its pathophysiologic effects on the right heart and severity dependent management options (calcium antagonists, vasodilators, nitrates, prostacycline, inhaled nitric oxide, etc.)
- **Lung**
 - Understand the **fundamental anatomy and physiology of the lung** and its adaptation to disease/basic expression of failure (clinical signs and symptoms, laboratory abnormalities)
 - Understand the **concepts of ventilation/perfusion (mis-)match** and its implication on oxygen uptake
 - Understand the concepts of **West-zones** and influences of patient position (upright, supine, prone), intra-thoracic pressure, etc. on them
 - Understand **reactions of pulmonary vasculature** to alveolar hypoxia, inflammatory mediators, global hypoperfusion, hypercarbia, systemic vasoactive drugs, acidosis, etc.

	<ul style="list-style-type: none"> - Relate to common pulmonary diseases/conditions: COPD, pulmonary fibrosis, atelectasis, pulmonary embolism, (large) pleural effusion), etc.; oxygen delivery: cardiac output, perfusion pressure and varying preload, pump - Understand the common causes of acute respiratory failure (including exacerbation of chronic failure) and the fundamentals of their medical management: <ul style="list-style-type: none"> - Infection (pneumonia, sepsis) - Asthma (reactive airway disease), COPD - Restrictive lung disease - Kyphoscoliosis, restrictive chest wall disease, disruption of thoraco-abdominal mechanisms post-surgery (open abdomen, increased intra-abdominal pressure, splinting [pain]) - Cardiac failure, pulmonary embolus - Hemo-/pneumothorax, large pleural effusion - CNS disorders, peripheral neuropathy and myopathy, sedative-narcotic overdose - Describe the commonly used indications for initiation (and termination) of ventilation support, including: <ul style="list-style-type: none"> - Indications and commonly acceptable values for initiation of mechanical ventilation - Evaluation of airway; evaluation of adequacy of thoracic pump (muscle strength); evaluation of lung parenchymal characteristics (arterial blood gases and chest X-ray) - 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 [PIP, MAP]) - Indications and commonly acceptable values for weaning from mechanical ventilation (neuro-status and muscular strength, minute ventilation, RVR [Tobin index], NIF, tidal volume, etc.) - Understand the concepts of ventilator management <ul style="list-style-type: none"> - NIBP vs. PIPB (mask and endotracheal intubation) - Fundamental modes of ventilation and their advantages and limitations (AC or VC or CMV, (S)IMV +PSV, PC, BIPAP, CPAP, APRV, basics of jet/oscillator ventilation) - Understand the concepts of Acute Lung Injury (ALI): Baro-/Volu-trauma, O₂-toxicity, inflammatory mediators, etc., and the concept of lung-protective ventilation strategies, ventilator-associated pneumonia (VAP)
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prevention, etc.

- Understand the **concept of PEEP** and its effects on ventilation/perfusion, atelectasis formation and ALI
- Understand the **concept of ARDS**, including common causes (systemic and local) and management (ventilation and oxygenation strategies, prone-position ventilation, use of anti-SIRS drugs, antibiotic therapy, use of corticosteroids)
- Understand the need for **VAP prevention, pulmonary physiotherapy and organized ventilator weaning** to improve outcomes
- Understand fundamental principles of the management of the long-term ventilator-dependent patient

- **Kidney**

- Understand the **basic anatomy and physiology of the kidney**, including renal perfusion, glomerular filtration, proximal and distal tubular function, loop of Henle and collecting duct function; understand the hormonal functions of the kidney (renin-angiotensin, aldosterone, vitamin D, etc.)
- Understand the fundamentals of the **evaluation of kidney function**:
 - Urine output, urine analysis, gravity, urine osmolality and electrolyte analysis, creatinine clearance
 - Ultrasonography, radionuclide studies
- Understand the definition, clinical signs and symptoms (including laboratory) of **renal dysfunction and failure** and its major causes in [S]ICU patients
 - Ischemia/under perfusion, including intra-abdominal hypertension
 - Infection
 - Obstruction
 - Inflammatory and toxic (medication, auto immune)
 - Preexisting disease
- Understand the **implications of renal failure on other organ systems**: heart, lung, CNS, bone and bone marrow, etc., drug metabolism and elimination (see ICU pharmacology)
- Understand **management of patients with high output syndromes** (renal or central diabetes insipidus, cerebral salt wasting, polyuric renal failure, diuretics)
- Understand role of **kidney (and lung) in acid-base disturbances**
 - Identify, define and classify (using ABG and other laboratory tests) the major categories of acid-base disturbance (metabolic acidosis and/or alkalosis, respiratory acidosis and/or alkalosis) in the context of the

	<p>patient's altered physiology; cite common clinical scenarios for their appearance</p> <ul style="list-style-type: none">- Renal tubular acidosis (differentiate between Type I and II)- Discuss the identification and correction of complex acid-base problems<ul style="list-style-type: none">- Hyperchloremic, metabolically-acidotic patient- Hypochloremic, metabolically-alkalotic patient- Stuporous, dehydrated, hypo- and hypernatremic patient- Patient with central diabetes insipidus- Hyponatremic, volume overloaded patient with carbon dioxide retention- Diagnosis and management of electrolyte disturbances (Na, K, Mg, PO₄, Ca, etc.) using conjunction of history, physical and laboratory testing- Understand the fundamentals of renal replacement therapy (RRT):<ul style="list-style-type: none">- Intermittent vs. continuous, basic modes of hemofiltration and dialysis, concept of dose delivery and efficiency- Common complications of RRT (bleeding, electrolyte and acid-base disturbance, access-related problems, hypothermia, volume changes, etc.)- Use of continuous RRT/hemofiltration in other disease processes (sepsis, burn, rhabdomyolysis, etc.)- Liver<ul style="list-style-type: none">- Understand the basic anatomy and physiology of the liver, including hepatic (dual) perfusion; understand complex involvement in metabolic and hormonal pathways, and waste product excretion; understand involvement in hemostasis- Understand the definition, clinical signs and symptoms (including laboratory) of liver dysfunction and failure (including fulminant) and its major causes in [S]ICU patients:<ul style="list-style-type: none">- Ischemia/under perfusion, including intra-abdominal hypertension- Infection (viral, bacterial)- Inflammatory and toxic (medication, auto immune)- Preexisting disease- Understand the implications of hepatic failure on other organ systems: heart, lung, CNS, bone and bone marrow, etc. drug metabolism and elimination (see ICU pharmacology)- Understand the fundamentals of hepatic support therapy (nutrition, gut decontamination, correction of coagulopathy, therapy for portal hypertension, indications for liver transplantation)
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- **Gut**

- Understand the concepts of **gut dysfunction in severe illness**, including: ileus, malabsorption/diarrhea, acute intestinal ischemia and bleeding, the concepts of bacterial translocation, stress gastritis and ulcer disease, pseudomembranous colitis
- Understand the **concepts of stress ulcer prophylaxis and therapy** in severely ill patients (H₂-blockers, PPI, Carafate, early enteral nutrition)
- Outline the **indications and methods for providing nutritional support** by completing the following activities:
 - Discuss indications, selection of formulations, cost, route of administration of **parenteral versus enteral** forms of nutrition
 - Explain **complications** (and benefits) of parenteral and enteral routes of feeding and select methods to avoid the complications
 - Discuss major types of **feeding formulations** ([semi-]elemental, immunonutrition, utility/disutility of disease-specific nutritional formulations, etc.) and their use in critically ill patients
 - 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;
- **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
- Prepare **recommendations for elderly patients** under these same conditions
- Discuss the concepts of **(selective) gut decontamination**, its use, benefits and problems, agents used
- Discuss use of prokinetic agents in gut dysfunction; management of high output loss states from the gastrointestinal tract and cardiac and metabolic implications
- Discuss the implications of (antibiotic related) C. difficile colitis in critically ill patients, including antibiotic therapy, gut rest vs. feeding, anti-diarrheal agents

- **CNS**

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

	<ul style="list-style-type: none">- Somnolence, stupor, coma,- Confusion, agitation, delirium- Stroke (ischemic, hemorrhagic)- Brain death: diagnosis, involvement of social work, transplant resource center, communication to family, etc.- Endocrine<ul style="list-style-type: none">- Hypothyroidism and hyperthyroidism in the critically ill- Hyperparathyroidism/hypoparathyroidism- Adrenal cortical excess (Cushing's disease and syndrome) and adrenal cortical deficiency states (Addison's disease)- Disturbance of glucose metabolism and diabetes mellitus<ul style="list-style-type: none">- Importance of tight glucose control for prevention of infections and overall outcome improvement- Use of subcutaneous vs. IV insulin, intermittent dosing vs. continuous infusion therapy- Immune system/bone marrow<ul style="list-style-type: none">- Definition of SIRS and sepsis; fundamental understanding of the immune reaction to trauma, infection, stress; understanding of the benefits and potentially harmful sequelae of immune system activation; understanding of the dynamic nature and basic time course of the immune response in critically ill patients- Immunosuppression of critical illness: the role of hyperglycemia, steroids, (multiple) organ dysfunction, infection, etc. - management and prevention- AIDS and critical illness- Discuss the evaluation and treatment of the following bleeding disorders:<ul style="list-style-type: none">- The role of blood vessels, platelets, fibrin cascade and degeneration in normal hemostasis- Disseminated intravascular coagulopathy (DIC), common causes and therapy- Thrombocytopenia as a failure of production, accelerated destruction or dilution- Hemophilia A, Von Willebrand's disease, idiopathic thrombocytopenia purpura (ITP) and thrombotic thrombocytopenia purpura (TTP) as causes of thrombocytopenia (compare and contrast)- Heparin or Coumadin therapy misapplication- Advanced liver disease- The role of protein C, S, ATIII and lupus circulating anticoagulant, and their roles in bleeding disorders
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- **Diagnosis and management of anemia**

- Erythropoietin, iron (IV/enteral, potential complications and risk of infection), VitB₁₂, folate
- **Transfusion:** Outline the clinical and laboratory indications, common problems and complications for transfusion of the following blood products:
 - Packed red cells
 - Fresh frozen plasma
 - Platelets
 - Cryoprecipitate
 - Whole blood
 - Specific clotting factor concentrates (VIIa, VIII, IX, XII)

- **Nosocomial infections, SIRS, sepsis – management and prevention**

- **SIRS and sepsis:** definition, common etiologies in the [S]ICU patient, supportive therapy ****(see organ support therapies)****, source control therapy and antibiotics, novel strategies of support, including activate Protein C, crystalloid vs. colloid and isotonic vs. hypertonic resuscitation, use of vasopressin in septic hypotension
- **BSI and line infections:** CDC recommendations for prevention diagnosis and therapy
- **Nosocomial and ventilator-associated pneumonia:** diagnosis (CDC-NNIS criteria: qualitative vs. quantitative sputum cultures, BAL/PSB), patient and unit specific empiric and culture guided antibiotic therapy, adjunct therapy (immune support, pulmonary physiotherapy), prevention (CAS, Peridex, CDC guidelines)
- **UTI:** CDC guidelines for prevention, diagnosis and therapy
- **Surgical site infections:** CDC guidelines for prevention, diagnosis and therapy; considerations for pre-operative prevention
- **Influence of iatrogenic or pre-existing immune deficiency**
- **Use of preventive antibiotics (anti-fungals) and complications of (prolonged) antibiotic use**
- **ICU fever work-up:** outline the principles of post-operative fever with respect to causes, empiric diagnostic modalities and specific therapy. How useful are these principles when considering the elderly patient?

▪ **Shock**

- **Types, history, clinical signs and symptoms**
 - Cardiogenic (volume overload, MI, cardiac contusion, CHF, etc.)

- Hypovolemic (trauma, 3rd spacing, fever, diarrhea/vomiting, etc.)
- Distributive (septic, anaphylactic, neurogenic, adrenal insufficiency, etc.)
- Obstructive (cardiac tamponade, tension pneumothorax, pulmonary embolus)
- Propose an algorithm for diagnosing cause of shock state and initiating appropriate treatment utilizing progressively invasive methods of monitoring and management
- **Graded invasive monitoring** *****(see organ support therapies)*****
- **Early goal-directed therapy**
 - Measures of organ perfusion (ABG, S_vO₂, lactate, base excess, organ dysfunction, GI-mucosal pH, etc.)
 - Crystalloid vs. colloid, isotonic vs. hypertonic resuscitation, use of blood products
- **Novel therapies**
- **Cardiac arrest**
 - Discuss the **pathophysiology and mechanism of arrest**, for the following:
 - Acute myocardial infarction, acute dysrhythmia
 - Congestive heart failure
 - Hypovolemic shock (blood loss, dehydration), hemorrhagic shock (non-trauma)
 - Burns
 - Septic shock
 - Anaphylactic shock (envenomation, drug related)
 - Acute adrenal insufficiency
 - Penetrating or blunt trauma
 - Tension pneumothorax
 - Pericardial tamponade
 - Hemorrhagic shock
 - Hypothermia
 - Substance abuse
 - Electrical injury
 - Suffocation
 - Acute stroke
 - Outline the surgical house staff role on the “**code team**”
 - Demonstrate proficiency in **cardiopulmonary resuscitation** according to ACLS guidelines
- **ICU pharmacology**
 - The resident should develop a fundamental understanding of the following classes of drugs and their use in critically ill patients, including dosage, duration

of action, common side effects and interactions, altered metabolism and excretion in (hepatic and renal) organ dysfunction, monitoring of drug levels and therapeutic effects:

- Inotropes and pressor agents
- Anti-hypertensive agents/'Cardio-protective' agents/antiarrhythmic agents
- Antibiotics and anti-fungal agents
- Anticoagulants/Anti-platelet agents
- Insulin and oral anti-diabetic agents
- Respiratory agents
- Agents for gastric protection (H₂ blocker, PPI, Carafate, antacids)
- Hemopoetics (Erythropoietin, Iron, Vitamin B₁₂, Folate, etc.) and (anti-)clotting agents (aspirin, Plavix, heparin(oids), warfarin, vitamin K, Factor VIIa, etc.)
- Anti-SIRS agents
- Hormones (corticosteroids, mineralocorticoids, thyroid hormone, etc.)
- Sedatives, narcotics and non-narcotic analgesics and antipyretics

▪ **Prevention and management of common complications**

- **Stress gastritis and ulcer**

- Patients at risk: previous ulcer disease, (neuro-)trauma, burn, sepsis, etc.
- Prevention/Therapy: H₂-blockers, PPI, Carafate, early enteral nutrition, etc.

- **DVT and PE**

- Patients at risk: (GI) cancer, obesity, trauma/orthopedic procedures, etc.
- Use of compressive stockings and or (sequential-) compression devices vs. use of heparin(oids) and/or warfarin or anti-platelet agents
- Complications of anticoagulation therapy
- Diagnosis and management of PE, indications for (emergent) surgical intervention (filters, thromboembolectomy, intra-pulmonary lysis therapy, etc.)

- **Myocardial ischemia**

- Identification of patients at risk
- Preventive beta-blocker (and other) therapy
- Diagnosis of acute ischemic syndromes and management (medical, interventional)

- **Catheter-related infections** (see BSI)*****

- **ICU psychosis**

- (Protocol driven) goal-directed sedation and analgesic management; utility of "emergence"-strategies

- Importance of sleep and biorhythm
- Management of acute delirium and psychosis
- **Skin breakdown/decubitus ulcer**
- **Anemia of critical illness**
- **Provider contamination** (universal precautions, infection control)
- **ICU laboratory and radiographic testing**
 - Considerations for goal-directed, cost-sensitive care in the workup and monitoring of critically ill patients
- **ICU procedures** (see patient care competency)
- **The elderly ICU patient:** Analyze and use examples to describe the significance of the following characteristics that are different and/or more frequent in the older patient:
 - Vague, imprecise symptoms, atypical disease presentation
 - Comorbidity and poly-pharmacy
 - Possibility of cognitive impairment
 - Different normal values for common diagnostic tests
 - Likelihood of decreased functional reserve
 - Inadequate social support systems
- **Novel and investigational approaches in ICU technology and management**
- Outline the unique problems of the following surgical **subspecialties** in critical care management:
 - Neurosurgery
 - Urology
 - Orthopedics
 - Pediatric surgery
 - Cardiac surgery
 - Thoracic surgery
 - Burns
 - Trauma

Objectives – General:

- **Complete the reading assignment (see literature list)**
- **Attend all (≥ 85%) conferences, M&M conferences, Grand Rounds/other educational activities of the Department of [S]ICU during the rotation**
- **Take a post-rotation self-assessment test with at least 75% correct answers**

<p>Practice-based Learning and Improvement:</p>	<p><u>Goals and Objectives:</u></p> <p>Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:</p> <ul style="list-style-type: none"> ▪ <u>Self assessment:</u> Analyze practice experience during the rotation, as well as own performance-based on interaction with [S]ICU attendings and other key [S]ICU staff; accept and use constructive criticism to improve performance in the six core competencies. ▪ <u>Medical knowledge:</u> Self-directed and under mentorship of the [S]ICU attending staff, locate, appraise and assimilate evidence from scientific studies related to their patients' health problems; Use evidence based medicine approach to patient care whenever possible; apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness; use information technology to manage information, access online medical information and support their own education; facilitate the learning of students and other healthcare professionals on the [S]ICU service by sharing pre-existing and newly acquired knowledge (general and case-based) on rounds and during formal educational activities. Residents are encouraged to ask/question the [S]ICU attending staff and/or other [S]ICU surgery related expert providers for clarification of unclear concepts/practices at any time. ▪ Participate in the <u>management of [S]ICU patients</u> as outlined in the patient care competency; during the rotation the resident should become familiar/proficient with the bedside management of critically ill surgical patients, their common problems/complications and the management thereof. ▪ Perform/participate in <u>[S]ICU related operations and procedures</u> as outlined in patient care competency.
<p>Interpersonal and Communication Skills:</p>	<p><u>Goals and Objectives:</u></p> <p>Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients, their patient's families and professional associates. Residents are expected to:</p> <ul style="list-style-type: none"> ▪ Develop interpersonal skills necessary to <u>communicate effectively</u> with patients, patient families, nursing staff, mid-level healthcare providers, ancillary staff, medical students, fellow residents and attending staff in the complex multi-specialty environment that constitutes [S]ICU ▪ Contribute to <u>creating an atmosphere of collegiality and mutual respect</u> with all providers involved in the care of patients

	<ul style="list-style-type: none"> ▪ Develop effective listening, questioning and documentation skills ▪ Demonstrate ability to work effectively as a member of a team ▪ Demonstrate ethically sound behavior (see also Professionalism) ▪ Share personal knowledge with other members of the team to foster an environment of learning
<p>Professionalism:</p>	<p><u>Goals and Objectives:</u></p> <p>Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to a diverse patient population. Residents are expected to:</p> <ul style="list-style-type: none"> ▪ Demonstrate adherence to institutional and departmental standards and policies ▪ Demonstrate respect, compassion, integrity and ethical behavior consistent with the values of the department and institution; develop and sustain sensitivity toward differences of age, gender, culture, religion, ethnicity or other diversities in both co-workers and patients ▪ Demonstrate ability to appropriately take on, share and delegate responsibilities with regard to patient care; balance own rights and privileges appropriately with responsibilities and accountability resulting from being a member of a team dedicated to patient care ▪ Demonstrate commitment to excellence and on-going professional development ▪ Under attending and other [S]ICU staff guidance, develop skill to resolve potential problems and conflicts that occur in a complex corporate environment using the appropriate channels and methods of communication to maximize patient care and surgical service performance ▪ Evaluate and formulate a response to ethical questions, including: <ul style="list-style-type: none"> 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.
<p>Systems-based Practice:</p>	<p><u>Goals and Objectives:</u></p> <p>Residents must demonstrate an awareness of and responsiveness to the larger context and system of healthcare and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:</p> <ul style="list-style-type: none"> ▪ Understand how choices in patient care and other professional practices affect other healthcare professionals, the healthcare organization and the larger society and how these elements of the system affect their own practice:

	<p>a. Average cost of ICU daily care, individual and cohort cost related to nosocomial infection and other complications related to critical care</p> <p>b. The relevance and components of clinical pathways and how to deal with deviation.</p> <ul style="list-style-type: none"> ▪ Practice cost-effective healthcare and resource allocation that does not compromise quality of care ▪ Know how to partner with healthcare managers ([S]ICU coordinator, social work, case management, PT/OT and Rehabilitation medicine, etc.) and other healthcare providers (PMD, Specialty Providers in and out of the hospital) to assess, coordinate and improve healthcare for the individual patient and cohorts of patients
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Appendix: S.C.O.R.E. Curriculum

<p>Surgical Council on Resident Education</p> <p>The SCORE® Curriculum Outline for General Surgery is a list of topics to be covered in a five year general surgery residency program. Graduating residents are expected to be competent in six areas: patient care; medical knowledge; professionalism; interpersonal and communication skills; practice-based learning; and systems-based practice.</p> <p>The <i>SCORE Portal</i> (www.surgicalcore.org) has been created to provide educational content and assessment in support of the curriculum to general surgery residency programs. Learning “modules” are available on the portal for nearly all of the topics listed in this booklet</p> <p>Patient Care Classification System</p> <p>The patient care curriculum topics are organized into 28 organ-based categories. Within each category, the topics are further separated into Diseases/Conditions and Operations/Procedures. With this edition, the topics are then stratified into two levels using the same classifications:</p> <ul style="list-style-type: none"> • <i>CORE</i> – Diseases and procedures encountered in general surgery for which a graduate of training will possess significant knowledge and be able to provide comprehensive care, including procedural competency. 	<p>Diseases/Conditions</p> <p><i>Core</i></p> <ul style="list-style-type: none"> • Abdominal Compartment Syndrome • Anaphylaxis • ARDS and Respiratory Failure • Cardiac Arrhythmias - Common • Cardiac Failure • Cardiogenic Shock • Coagulopathy • Derangements of Electrolytes and Acid-Base Balance • Endocrine Dysfunction • Gastrointestinal Failure • Hepatic Failure and Hepatorenal Syndrome • Hypovolemic Shock • Neurogenic Shock • Neurologic Dysfunction • Pneumonia - Hospital-Acquired • Postoperative Delirium • Renal Failure • Septic Shock <p>Operations/Procedures</p> <p><i>Core</i></p> <ul style="list-style-type: none"> • Airway Management/Ventilator Management • Arterial Catheter Placement • Central Venous Catheter Placement • Compartment Pressures (Abdomen, Extremity) - Measurement • Damage Control Laparotomy and Management of the Open Abdomen • Defibrillation and Cardioversion • Endotracheal Intubation • Enteral Feeding Tube Placement • Invasive Hemodynamic Monitoring • Oxygen Administration Devices • Paracentesis
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• *ADVANCED*– Diseases and procedures that are not consistently part of general surgery practice for which a graduate of training should have sufficient knowledge to make a diagnosis and provide initial management. In some instances, graduates will have sufficient knowledge and experience to provide comprehensive care

Operations/Procedures

Core (cont.)

- Pulmonary Artery Catheter Placement
- Thoracentesis
- Ultrasound Use for Intravascular Access
- Urinary Catheterization

Advanced

- Cardiac Pacing
- Temporary Transvenous Pacemaker