

**CRITICAL CARE MEDICINE SELECTIVE  
MED 833**

**Course Title, Department, & Number: MED 833**

**Course credit or length: 2 Weeks**

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**Course location:** Cabell Huntington Hospital; and on occasion, Veteran's Administration Medical Center

**Description and Goals of course:**

The primary purpose of this elective is to provide the senior medical student with a diverse, well-rounded, meaningful, and focused exposure to the field of Critical Care Medicine. Students will have the opportunity to apply the basic physiology learned in their initial three years to the critically ill patient.

**Learning Goals and Objectives:**

The primary goals of this selective are as follows:

- To learn how to protect patients from complications associated with stays in the intensive care unit
- To learn about the application of palliative care medicine principles in the intensive care unit setting.
- To learn to work as part of a multidisciplinary care team

**INSTITUTIONAL GOALS AND OBJECTIVES MET OR ADDRESSED**

**Patient Care:**

**During this rotation, students will:**

1. Receive instruction on and learn to manage critically ill patients admitted to the intensive care unit
2. Gain experience in performing comprehensive history and physical examinations on the critically ill

3. Demonstrate basic knowledge of and initial management of patients with common ICU admission including but not limited to: sepsis/septic shock, GI hemorrhage, diabetic ketoacidosis, hypoxemic and hypercapnic respiratory failure, myocardial infarction, pulmonary embolus, multilobar pneumonia, pancreatitis, multi-system organ failure, initial triage and differentiation of various shock states (treatment of hypovolemic shock, cardiogenic shock, obstructive shock), cardiac arrhythmias/valvar disease, cardiac tamponade and meningitis, ventilator management, and various other metabolic, endocrine, cardiac and neurologic disorders

### **Medical Knowledge:**

#### **The student will demonstrate knowledge of:**

1. How to initiate and manage invasive and non-invasive modes of mechanical ventilation
2. Various drug overdose syndromes and associated anecdotal treatments
3. Basic pathophysiology, assessment and management of respiratory failure (including interpretation of EKG's and the use of mechanical ventilation)
4. Basic pathophysiology and management of shock and multiple organ failure syndrome (including the use and interpretation of invasive hemodynamic monitoring),
5. Basic familiarity with the nutritional support of the critically ill
6. Basic familiarity with the common procedures used in critical care, including central line placements, intubations, thoracentesis and other intensive care related procedures.
7. Basic knowledge of how to order and interpret appropriate ancillary studies such as lab tests, and how to apply the results of arterial blood gas analysis
8. Management of end of life issues in the intensive care setting.

### **Practice Based Learning and Improvement:**

#### **The student will**

1. Complete assigned reading
2. Identify knowledge gaps and seek out methods to correct.
3. Review medical literature specific to assigned patients.
4. Utilize online resources for reading assignments
5. Identify indications for central venous access and invasive hemodynamic monitoring

### **Interpersonal and Communication skills:**

#### **The student will be able to**

1. Demonstrate basic ability obtain critically ill patient history
2. Discuss warning signs of complications
3. Participate and learn effective communication with the family members
4. Communicate patient information with other members of the health care team
5. Develop interpersonal and communication skills

### **Professionalism:**

#### **The student will demonstrate**

1. Ability to obtain informed consent
2. Ability to maintain patient confidentiality

### **System Based Practice:**

#### **The student will demonstrate**

1. Ability to utilize consultants
2. Develop skills to create a problem or system based assessment and plan

### **Case Presentations on Work Rounds**

1. For new patients, standard case presentation: Pertinent history, physical examination, labs, electrocardiograms (EKGs), X-rays, special tests, etc.
2. For patients already in the MICU, review of the last 24 hours: Be aware of any changes in examination and be familiar with vital signs, intake and output (I/O), hemodynamic data, recent lab results, recent microbiology results, EKG, radiological studies and all of a patient's medications. In the MICU, details are important.
3. Discussion should be problem-oriented. Common problems encountered in the MICU include shock (always problem #1), sepsis, pneumonia, acute respiratory distress syndrome (ARDS), chronic obstructive pulmonary disease (COPD) and respiratory failure, congestive heart failure (CHF) or pulmonary edema, renal failure, gastrointestinal (GI) bleeding, thrombocytopenia, drug overdose and agitation/anxiety. Assessment and plan should be organized problem by problem.
4. "Housekeeping issues" for all MICU patients include:
  - a. Invasive monitors (dates of insertion and number of days):

- i. Endotracheal tube
  - ii. Nasogastric (NG) tube
  - iii. Arterial line
  - iv. Central venous catheter
  - v. Pulmonary artery (PA) catheter
  - vi. Foley catheter
  - vii. Surgical drains
- b. Nutrition
  - c. Deep-vein thrombosis (DVT) prophylaxis
  - d. Stress gastritis prophylaxis
5. Nursing issues, psychosocial issues
6. Brief review of 24-hour plan

Afternoon rounds: Afternoon rounds are needed in critically ill patients to follow up on the morning plan and to review the events of the day. Potential problems that could occur overnight should be anticipated and discussed. During these rounds, the MICU attending and/or fellow will meet with the on-call Pulmonary attending and/or fellow and the on-call residents to briefly review the status and overnight plans for the patients on the MICU service. Later in the evening, the fellow or attending may also contact the student to discuss any problems.

### **Medical Record Documentation**

Students should become familiar with the writing of full admission notes, daily progress notes, procedure notes and physician orders, and dictating discharge summaries. The progress note should describe significant events of the previous 24 hours, significant symptoms, significant signs and relevant data. The note should delineate the MICU team's assessment and plans for each of the patient's problems.

### **Procedures in the MICU**

Patients in the MICU often need mechanical ventilation and invasive monitoring. Students are expected to learn, observe and may perform, under the supervision of the

fellow or attending, procedures commonly needed in the ICU setting, including arterial cannulation, central venous cannulation, pulmonary artery catheterization, airway management and endotracheal intubation. Proper technique for these procedures will be taught in both didactic sessions and at the bedside.

### **Insertion of Arterial and Central Venous Catheters**

1. All line insertions or changes should be done as soon after work rounds as possible.
2. Students may insert arterial or central venous catheters only when supervised by the MICU fellow or attending until they have demonstrated competence in the technique.
3. Pulmonary artery catheters placed in MICU patients must be supervised by a MICU attending or fellow at all times.
4. After two unsuccessful attempts at localization and cannulation of the artery or central vein, the student should yield to a more experienced operator.

### **Guidelines for Catheter Management**

1. Central venous catheters and PA catheters should be placed using strict aseptic technique with full barrier precautions—mask, cap, gloves, sterile gown, long sterile drape, etc. Personnel in the room should wear masks and caps.
2. Mask, cap, gloves, sterile gown and sterile drapes should be used when inserting arterial catheters. Personnel in the room should wear masks and caps.
3. There are data that regular catheter changes over a guide wire do not reduce risk of catheter-related infections, and that regular catheter changes at a new site may reduce the risk of catheter-related infections but increase the risk of mechanical complications such as bleeding or pneumothorax.

### **Current recommendations:**

Central venous catheters may remain in place as long as needed provided there is no evidence of catheter-related sepsis (unexplained fever >48h after catheter insertion, positive blood culture, local signs of infection at the insertion site).

Pulmonary artery catheters should be changed every four days.

If there is suspicion of catheter-related sepsis, the catheter should be changed to a new site if the original site appears infected.

4. In changing catheters over a guide wire
  - a) Use aseptic technique and full barrier precautions
  - b) Glove twice—change gloves after pulling out the original catheter and before inserting the new catheter over a guide wire
  - c) Replace entire delivery system (tubing and bags/bottle)
  - d) Quantitatively culture the old catheter tip if the patient has an explained fever, leukocytosis or other signs of infection
  - e) If the catheter culture is later positive (>15 bacterial colony forming units), the new catheter should be removed and a new site selected for a fresh central venous catheter. Any fungal growth on a catheter tip is considered a catheter-related infection.
5. Because the risk for catheter-related infection is apparently less for arterial lines compared to central venous lines, it seems reasonable to maintain necessary arterial lines for approximately seven to eight days if the insertion site appears uninfected. However, because the risk for pseudoaneurysm formation is related to the duration of catheterization, a new insertion site should be used rather than changing the arterial line over a guide wire.
6. These guidelines discourage the practice of routine line changes every three to five days but do not give us license to ignore the lines. Rather, they encourage the use of clinical judgment in deciding if and when a line should be changed.

### **Guidelines for Endotracheal Intubation**

1. All intubations should be supervised by the MICU attending, MICU fellow or an anesthesiologist. If a MICU patient requires intubation during nighttime hours, contact the Surgical Intensive Care Unit (SICU) resident on-call; there is also an attending anesthesiologist in house if needed. Call for assistance before attempting intubation. The SICU resident or the anesthesiologist is in charge of managing the airway once he or she arrives at the bedside; it is up to the SICU resident or anesthesiologist to decide whether the MICU student should attempt intubation, but the MICU student should not be afraid to ask.
2. After one unsuccessful attempt at intubation, the student should yield to a more experienced operator.

## **A Word About Drawing Blood**

1. Be judicious in blood tests ordered. Remember that blood is a valuable commodity and should not be wasted. Unnecessary blood loss is all too common in ICUs.
2. There is a laboratory policy to draw no more than four sets of blood cultures per 24-hour period unless a supervisor approves more.

## **Active Learning Sessions (Students should read up on the following topics during their Selective Experience)**

- Mechanical ventilation and weaning from mechanical ventilation
- Use of pulmonary artery catheters
- Enteral and parenteral nutrition
- Radiology in the ICU
- Vasopressors
- Sepsis
- Acid-base disorders
- Common fluid-electrolyte disorders in the ICU
- Sedation in the ICU
- Neurologic emergencies
- Pharmacokinetics

## **Practical Instruction**

- Airway management
- Central venous, pulmonary artery and arterial cannulation
- Calibration and operation of hemodynamic recording systems
- Monitoring patients on mechanical ventilation

### **Learning environment and evaluation methods:**

1. Attending rounds (Teaching)
2. Attending rounds (Work)
3. Didactic lectures
4. Directly observed procedures

## **ASSESSMENT METHODS**

### **Mid Point Evaluation**

In accordance with LCME standard ED-30, the Course Director will evaluate student performance at the end of the first week and feedback will be provided orally to the student.

### **Preceptor Evaluation- 75%**

#### **Grading Mode: Honors/Pass/Fail**

The preceptors' evaluation will be based upon, but are not limited to, the following factors:

- Attendance and participation in tutorials
- Conference attendance
- Maturity and Professionalism
- Oral Case Presentation/Patient Workup
- Participation in call
- The demonstration of basic knowledge of critically ill patient care.

### **Exam- 25%**

The student will be required to take an exam at the end of this course. Should a student not score at least a 75% on the first attempt, the student will be given an opportunity to retest. If a 75% passage is obtained on the second attempt, the student's exam score will be comprised of the average of both exam score. The exam will account for 25% of the final grade.

### **Evaluation of Course and Faculty Requirement**

Completion of evaluations of Course and Faculty members by students is a required component of this course. Students will be issued an "Incomplete" until the course and faculty evaluations have been submitted.

**MUJCESOM Policies:** All medical students taking this course will comply with School of Medicine policies given at <http://musom.marshall.edu/students/policies>.

Individual policies can be found at the following websites:

**Student Infectious Material Exposure:**

<http://musom.marshall.edu/ups/postexposure.asp>

MS-IV Attendance:

<https://musom.marshall.edu/students/documents/policies/Yr4attendance.pdf>

Academic Dishonesty Policy:

<https://musom.marshall.edu/students/documents/policies/Standards-of-Professionalism-and-Honor-Code.pdf>

Academic Standards Policy:

<https://musom.marshall.edu/students/documents/Policies/ASC-FINAL-POLICY.pdf>

Policy for Students with Disabilities:

<https://musom.marshall.edu/students/documents/Guidelines.pdf>

University Computing Services' Acceptable Use Policy:

<http://www.marshall.edu/ucs/CS/acptuse.asp>

Affirmative Action Policy:

pp. 16-17

[http://www.marshall.edu/catalog/Graduate/S2008/gr\\_sp08.pdf](http://www.marshall.edu/catalog/Graduate/S2008/gr_sp08.pdf)

Inclement Weather Policy:

<https://musom.marshall.edu/students/documents/policies/MUSOM-Inclement-Weather-Policy.pdf>

Notification of delays and cancellations of classes are posted on the Medical Education Home Page when Marshall University Main Campus is not in session

<https://musom.marshall.edu/weather>

### **Required Reading:**

To be assigned by Course Director

*The ICU Book*, 3<sup>rd</sup> edition, by Paul R. Marino, 2006, Lippincott Williams and Wilkins.

*Critical Care Secrets*, 4<sup>th</sup> edition, Parsons/Wiener-Kronish, 2007, Mosby.

In addition, students will be provided key critical care references from the past decade or so in the field of critical care medicine. They will also be distributed the Society of Critical Care Medicine "Medical Student's Guide to Intensive Care Medicine" PDF document.