

## **Critical Care Medicine Subspecialty**

### **Course Name:**

Critical Care Medicine Subspecialty

### **Course Duration and Structure:**

The training in this period is 24 months

### **Program Description:**

Critical Care Medicine course is a multidisciplinary program, divided from Anesthesiology and Internal Medicine.

Students' activities are diagnosis, care and treatment of a wide range of clinical problems in patients with severe life-threatening failures in their one or more organs.

Students are also responsible for ensuring, maintaining and improving the health of acute patients with multi-organ dysfunction during hospitalization, discharge or transfer or follow-up in the clinic with all-round care, support and management.

### **Aims (General Objectives):**

#### **Mission**

The mission of this course is to train knowledgeable, manager, producer, innovator, seeker, creator specialist, with spiritual and professional ethics, who can be effective and integrated with the acquisition of knowledge, skills, insight and management at the highest level of these capabilities. Specialists are required to use these abilities and skills in life support, prevention, diagnosis, treatment, care and monitoring of critically ill patients, individually or in the form of a specialized team. Also, they should be clever in the field of training of specialized forces, nursing and education in the society and in carrying out research studies in the field of improving health and reducing complications and treatment costs.

#### **Vision**

Reducing mortality rate and length of hospitalization in ICU, at the highest global standards level, and bringing the level of special care of the country to the first rank of the region in the next 10 years.

### **Admission Requirements:**

Specialized diploma holders in the fields of Anesthesiology and Internal Medicine.

## **Expected Outcomes:**

Students of this course are expected to be able to:

- Establish effective and appropriate professional communication with the patient, accompanying patients, health team members and health officials to solve the problem of the patient or the community.
- Diagnose the disease by taking the description of the condition, performing clinical and paraclinical examinations and evaluations.
- Choose appropriate preventive, diagnostic, therapeutic and care approaches and methods for patients and use them with sufficient mastery and skill to solve the patient's problem.
- Take sufficient ability in the education of different categories, including patients and their companions, the general society and the university community in the field of related specialization.
- Have constructive cooperation and interaction in the country's research system.
- Have constructive interaction with experts of different fields and courses.
- Play an effective role in improving the health status of the society by proposing or using different strategies.
- Consider issues related to professional ethics in all actions.
- Use scientific prioritization methods for patient acceptance.
- Have scientific and practical skills in diagnosing and treating life-threatening injuries and disorders of patients in the ICU.
- Establish appropriate and effective professional communication with patients and their companions and colleagues.
- Diagnose the disease or problem in patients in critical conditions, perform all treatment and care measures for them with control.
- Provide the necessary psychological support for patients, families and health team members during diagnostic and therapeutic interventions.
- Considering the economy of treatment, perform diagnostic tests and therapeutic measures for the patient.
- Be able to learn the concepts of special care in different medical categories and related professions.
- Cooperate with multi-specialty groups and have the ability to consult with other colleagues.
- Be responsible for group leadership and management in medical, educational and research responsibilities.
- Defend and support the rights of patients and their families in special circumstances.
- Design and implement appropriate and applied research in the field of special care medicine and, if appropriate, take a step towards the production of science in the field of special care by setting up research centers.
- Observe professional ethics in all their actions, especially aggressive actions.
- Be diligent in learning new methods of monitoring and treating patients and updating your theoretical and practical knowledge.

## **Expected Competencies and Skills for Graduates at the End of the Program**

### **A. Expected Competencies & Procedural Skills:**

#### **Collecting and Recording Information:**

- Effective professional communication,
- Obtaining a special case description,
- Evaluation and specialized examination of patients,
- Logical request of paraclinical trials,
- Creating a file, recording information and organizing medical documents.

#### **Clinical Reasoning, Diagnosis and Decision-making for the Patient:**

- Interpretation of paraclinical tests,
- Integration of clinical and paraclinical findings,
- Conclusion and clinical judgment,
- Disease diagnosis,
- Clinical decision-making to solve the patient's problem.

#### **Patient Management:**

- Logical drug prescription, writing prescription and order,
- Choosing the most appropriate diagnostic-therapeutic approach and implementing it for the patient,
- Requesting and providing medical advice,
- Creating the necessary arrangements and patient referral,
- Patient education,
- Effective communication with the patient's family or caregivers,
- Patient follow-ups.

#### **Other Capabilities:**

- Research,
- Leadership and management,
- Providing specialized consultations,
- Protection and defense of patients' rights,
- Evidence-based medicine,
- Using a computer and searching for scientific information in electronic resources,
- Community health monitoring,
- Expression, translation, reading and writing in English.

Note: Assistants will acquire most of the above-mentioned abilities during their specialization period and will master them in this section.

## **B. Expected Specific Competencies and Skills:**

### **Professional Duties of Students:**

The professional duties of the students are as follows (in the order of each role):

#### **In a Diagnostic-Therapeutic-Care Role:**

- Taking a description of the situation and carrying out specialized examinations and recording the findings in the file.
- Logical request for diagnostic paraclinical tests.
- Performing authorized diagnostic procedures and included in this program.
- Request for specialized consultations.
- Diagnosing the disease and recording it in the file.
- Choosing the appropriate therapeutic approach, including drug, surgical or rehabilitation, curative or conservative (palliative or protective) treatments for patients and applying it to the extent permitted by the field.
- Rational prescribing of drugs in drug treatments.
- Approval of the necessary rehabilitation actions.
- Follow up of patients and refer them, if necessary.
- Recording information and organizing related medical documents.
- Full management of all departments of ICU, surgical and trauma, internal, respiratory and toxicology, burn unit in hospitals.
- Establishing an effective and desirable professional relationship with the patient, family, referring physician, health team members and other individuals or units that are somehow related to solving the problem.
- Compilation of ICU sheet for special care file and predicting patients' mortality risk.
- Accurate examination of patients.
- Logical request of the required paraclinical trials.
- Carrying out appropriate and timely diagnostic measures.
- Interpretation of clinical and laboratory results and findings and clinical reasoning.
- Diagnosing the problem and taking the appropriate approach during treatment.
- Request for specialized consultations.
- Clinical monitoring, with appropriate use of special department equipment.
- Use of available equipment, especially respiratory and cardiac, brain and kidney support ones, appropriately.
- Performing the necessary medical diagnostic procedures and supportive treatments.
- Rational drug prescription.
- Performing appropriate intravenous and gastrointestinal nutritional methods.
- Medical diagnostic follow-ups and taking care measures on time.

- Documentation, accurate recording of findings and recording of all stages of diagnosis and treatment.
- Helping to improve the appropriate physical space, needed for the patient.
- Paying attention to the psychological aspects of diseases and making appropriate interventions.
- Applying professional rules and behavior in dealing with the patient, family and colleagues.
- Measures to rehabilitate patients with complications or chronic diseases.
- Participation in the stabilization and appropriate transfer of the critically ill patient.
- Patients Follow-ups and, if necessary, referring them and following up their treatment in related clinics.
- Monitoring the recording of information and the regulation of related medical documents.
- Participation in the development of monitoring and care protocols for critically ill patients based on the severity of the disease.
- Execution of compiled protocols

**In an Educational Role:**

- Educating patients, companions, health team members, universities and the community if needed.
- Compilation of short-term educational texts for doctors and nurses and manuals in the specialized field, related to the health system.
- Participating in continues related educational programs (Life-Long Learning)

**In an Advisory Role:**

- Providing specialized advice to patients, companions, other specialists, managers of the health system and legal organizations.

**In a Research Role:**

- Determining the research priorities of the ICU department.
- Cooperating in university and health system research projects.
- Publishing or reporting the results of the investigations to the officials of the health system.
- Reporting diseases and health problems related to the specialized field in the society and presenting corrective measures to the health system officials.

**In a Managerial Role:**

- Compilation of patient admission and discharge protocols with the cooperation of related people.
- Clarifying the connection between the ICU department and other departments of the hospital.
- Monitoring the treatment process of patients as an intervention.
- Compilation of guidelines with the cooperation of the following people.

- Methods of infection control and prevention and treatment of sepsis and decontamination of the department and equipment.
- Administration of the department, means and special care group.
- Cooperation in consulting, designing and helping to develop and manage special care departments.
- Participation in health policies, especially in emergencies and accident prevention.
- Creating appropriate coordination between other care-treatment groups.

### **Educational Strategies, Teaching Methods and Techniques:**

This program is based on the following strategies:

- Task-based learning, a combination of student and professor oriented.
- Community oriented learning, problem based learning.
- Subject directed learning, hospital based training.
- Evidence-based learning, systematic multidisciplinary learning with thematic integration if needed, compulsory education and in a small part of the elective course.

### **Teaching Methods and Techniques (Teaching & Learning Methods):**

In this course, the following teaching methods and techniques will be used:

1. Clinical Training Methods: morning report, educational rounds and grand rounds, case presentation with the approach to problem, approach to case, clinical pathology conference (CPC), morbidity & mortality report, and discharge and follow-ups of the patients.
2. Follow up Report Discharge: training methods in special groups such as training workshops for advanced child resuscitation, how to communicate and transmit bad news, problem solving, legal and ethical issues, teaching and research methods.
3. Working in Small Groups: such as brainstorming, group study, question and answer, journal club with a critical approach and the use of audio and visual technologies, photography conference.
4. Practical Trainings: training in the skill lab, practical skills training center and operating room, training procedures on mannequins (Moulage) and patients.
5. Simulation Methods: training through real or virtual demonstration cases, role playing of a standardized patient, role modeling.
6. Electronic and Virtual Training Methods: using the Internet, teleconference, patient problem management, using computerized PMP programs and the use of multimedia and standard training packages.
7. Use of Telematics Training: such as teleconsultation and using distance learning methods.

8. Participating in national and international congresses, conferences, educational panels, individual and group speeches.

9. Education through the implementation of research plans and the use of research results.

### **Student Assessment (Methods and Types):**

#### **Assessment Methods:**

- Written
- Verbal
- Computer interactive test
- OSCE
- DOPS
- Logbook evaluation
- 360-degree test
- Essay evaluation
- Portfolio assessment and other performances-based and work place-based methods
- Written test + evaluation of clinical skills

#### **Periods of Assessment:**

Yearly

#### **Titles of General, Basic or Clinical Courses:**

##### **COMMON PROBLEMS**

- Agitation and Delirium
- Management of Acute Pain in the Intensive Care Unit Fever and Hypothermia
- Very High Systemic Arterial Blood Pressure
- Low Systemic Arterial Blood Pressure
- Tachycardia and Bradycardia
- Respiratory Distress with Arterial Hypoxemia
- Acute Respiratory Failure
- Polyuria
- Oliguria
- Acid – Base Disorders
- Hyponatremia and Hyponatremia
- Hyperkalemia and Hypokalemia Hypophosphatemia and Hyperphosphatemia Hypomagnesaemia
- Hypocalcemia and Hypercalcemia
- Hypoglycemia
- Anemia of Critical Illness
- Thrombocytopenia

- Coagulopathy
- Hyperbilirubinemia
- The Management of Gastrointestinal Bleeding
- Ileus
- Diarrhea
- Rashes
- Chest Pain

### **CENTRAL NERVOUS SYSTEM:**

- Biochemical, Cellular, and Molecular Mechanisms of Neuronal Death and Secondary Brain Injury in Critical Care
- Critical Neuropathophysiology
- Advanced Bedside Neuromonitoring
- Coma
- Cardiopulmonary-Cerebral Resuscitation
- Management of Acute Ischemic Stroke
- Nontraumatic Intracerebral and Subarachnoid Hemorrhage
- Seizures in the Critically III
- Neuromuscular Disorders in the ICU
- Traumatic Brain Injury
- Spinal Cord Injury
- Neuroimaging
- Intensive Care after Neurosurgery
- Key Issues in Pediatric Neurointensive Care

### **RESPIRATORY DISORDERS**

- Bedside Monitoring of Pulmonary Function
- Principles of Gas Exchange
- Arterial Blood Gas Interpretation
- Respiratory System Mechanics and Respiratory Muscle Function Heart –Lung Interactions
- Assist –Control Mechanical Ventilation
- Patient-Ventilator Interaction
- Weaning form Mechanical Ventilation
- Noninvasive Positive –Pressure Ventilation
- High – Frequency Ventilation
- Extracorporeal Life Support
- Adjunctive Respiratory Therapy
- Indications for and Management of Tracheostomy
- Hyperbaric Oxygen in Critical Care
- Imaging of the Chest in the ICU
- Acute Lung Injury and Acute Respiratory Distress Syndrome Aspiration Pneumonitis and Pneumonia



- Severe Asthma Exacerbation
- Chronic Obstructive Pulmonary Disease
- Pulmonary Embolism
- Other Embolic Syndromes
- Pulmonary Hypertension
- Pleural Disease in the Intensive Care Unit
- Community –Acquired Pneumonia
- Nosocomial Pneumonia
- Pulmonary Infections in the Immunocompromised Patient Lung Transplantation
- Burns and Inhalation Injury
- Drowning
- Acute Parenchymal Disease in Infants and Children
- Pulmonary Edema

### **CARDIOVASCULAR DISORDERS**

- Hemodynamic Monitoring
- Acute Coronary Syndromes: Pathophysiology and Diagnosis
- Acute Coronary Syndromes: Management and Complications
- Invasive Cardiac Procedures: Percutaneous Transluminal Coronary Angioplasty, Mitral and Aortic Valvuloplasty
- Supraventricular Arrhythmias
- Ventricular Arrhythmias
- Conduction Disturbances and Cardiac Pacemakers
- Sudden Cardiac Death: Implantable Cardioverter-Defibrillators
- Severe Heart Failure
- Myocarditis in the Intensive Care Unit
- Acquired and Congenital Heart Disease in Children
- Pericardial Diseases
- Emergent Valvular Disorders
- Infectious Endocarditis
- Hypertensive Crisis and Urgency
- Cardiac Surgery: Indications and Complications
- Pathophysiology and Classification of Shock States
- Resuscitation from Circulatory Shock
- Inotropic Therapy in the Critically III
- Mechanical Support in Cardiogenic Shock
- Peripheral Arteriopathies Including Embolism

### **HEPATIC DISORDERS, GASTROINTESTINAL DISORDERS, AND NUTRITIONAL SUPPORT**

- Critical Care Nutrition
- Nutrition Issues in Critically III Children

- Portal Hypertension
- Ascites
- Gastrointestinal Hemorrhage
- Hepatorenal Syndrome
- Hepatopulmonary Syndrome
- Hepatic Encephalopathy
- Fulminant Hepatic Failure, Including Acetaminophen Toxicity Calculous and Acalculous Cholecystitis
- Acute Pancreatitis
- Peritonitis and Intra-Abdominal Abscess
- Ileus and Mechanical Small Bowel Obstruction
- Acute Megacolon in Critically Ill Patients

## **RENAL AND ELECTROLYTE DISORDERS**

- Clinical Assessment of Renal Function
- Metabolic Acidosis and Alkalosis
- Disorders of Water Balance
- Disorders of Plasma Potassium Concentration
- Disorders of Calcium and Magnesium Metabolism
- Fluids and Electrolytes in Pediatrics
- Acute Renal Failure
- Renal Replacement Therapy in the ICU
- Urinary Tract Obstruction
- Contrast Dye – Induced Nephropathy
- Glomerulonephritis and Interstitial Nephritis in the ICU

## **INFECTIOUS DISEASES**

- Antimicrobials in Chemotherapy Strategy
- Beta-Lactam Drugs Used in Critical Care
- Aminoglycosides
- Fluoroquinolones
- Macrolides
- Agents with Primary Activity Against Gram-Positive Bacteria Metronidazole and Other Antibiotics for Anaerobic Infections Prevention and Control of Nosocomial Pneumonia
- Vascular Catheter-Related Infections
- Pathophysiology of Sepsis and Multiple Organ Dysfunction Sepsis and Multiple Organ System Failure in Children
- Acute Bacteremia
- Infections of the Urogenital Tract

- Central Nervous System Infections
- Infections of Skin, Muscle and Soft Tissue
- Head and Neck Infections
- Human Immunodeficiency Virus Infection
- Infections in the Immunocompromised Patient
- Infectious Endocarditis
- Fungal Infections
- Tuberculosis
- Malaria and Other Tropical Infections in the Intensive Care Unit Rickettsia Diseases
- Acute Viral Syndromes
- Clostridium Difficile Colitis
- Tetanus
- Botulism
- Dengue Hemorrhagic Fever

## **HEMATOLOGIC AND ONCOLOGIC DISORDERS**

- Anemia and Red Blood Cell Transfusion in Critically III Patients
- Blood Component Therapy
- Management of Neutropenic Cancer Patients
- Venous Thromboembolism in Medical Surgical Critically III Patients
- Hematologic Malignancies in the Intensive Care Unit
- The Hematopoietic Stem Cell Transplantation Patient
- Organ Toxicity of Cancer Chemotherapy
- Hematology and Oncology in Children

## **ENDOCRINE DISORDERS**

- Hyperglycemic Comas
- Hyperglycemia and Blood Glucose Control in the Intensive Care Unit
- Adrenal Insufficiency
- Thyroid Gland Disorders
- Diabetes Insipidus
- Metabolic and Endocrine Crises in the Pediatric Intensive Care Unit

## **THE OBSTETRIC PATIENT**

- Cardiovascular and Endocrinologic Changes Associated with Pregnancy
- Hypertensive Disorders in Pregnancy

- Acute Pulmonary Complications in Pregnancy
- Postpartum Hemorrhage
- Trauma in the Gravid Patient

## **PHARMACOLOGY AND TOXICOLOGY**

- General Principles of Pharmacokinetics and Pharmacodynamics Poisoning: Overview of Approaches for Evaluation and Treatment
- Ethanol, Methanol, and Ethylene Glycol
- Anticonvulsants in the Intensive Care Unit
- Calcium Channel Blocker Toxicity
- Drug Dosing in the Patient with Renal Failure
- Antidepressant Drug Overdose
- Clinical Use of Immunosuppressant
- Digitalis
- Heavy Metals
- Hydrocarbons
- Lithium
- Theophylline and Other Methylxanthines
- Antipsychotics
- Principles of NSAID Therapy in Critical Care Medicine
- Opioids
- Pesticides and Herbicides
- Sedatives and Hypnotics
- Toxic Inhalations

## **PROCEDURES**

- Difficult Airway Management for Intensivists
- Bedside Ultrasonography
- Central Venous Catheterization
- Arterial Cannulation and Invasive Blood Pressure Measurement
- Bedside Pulmonary Artery Catheterization
- Cardioversion and Defibrillation
- Transvenous and Transcutaneous Cardiac Pacing
- Ventricular Assist Devices
- Pericardiocentesis
- Paracentesis and Diagnostic Peritoneal Lavage
- Thoracentesis
- Chest Tube Placement, Care, and Removal
- Fiberoptic Bronchoscopy

- Broncho Alveolar Lavage and Protected Specimen Bronchial Brushing
- Percutaneous Dilatational Tracheostomy
- Balloon Tamponade
- Placement of Feeding Tubes
- Lumbar Puncture
- Jugular Venous and Brain Tissue Oxygen Tension Monitoring
- Intracranial Pressure Monitoring
- Indirect Calorimetry and Metabolic Monitoring
- Cannulation for Extracorporeal Membrane Oxygenation
- Bedside Laparoscopy in the ICU
- Pediatric Intensive Care Procedures