

SYLLABUS

1. General information on the course

Full course name	Anaesthesiology and Intensive Therapy
Full official name of a higher education institution	Sumy State University
Full name of a structural unit	Medical Institute. Department of Emergency Medical Care and Disaster Medicine
Author(s)	Tkachenko Yuliia Anatoliivna
Cycle/higher education level	The Second Level Of Higher Education, National Qualifications Framework Of Ukraine – The 7th Level, QF-LLL – The 7th Level, FQ-EHEA – The Second Cycle
Semester	18 weeks during the 11-th semester
Workload	Credit value makes 2 credits of ECTS (European Credit Transfer and Accumulation System), i.e. 60 academic hours, 30 ac. hours of which are conducted through face-to-face teacher-student learning; student's independent work amounts 30 ac. hours. Full-time education.
Language(s)	English

2. Place in the study programme

Relation to curriculum	Compulsory course available for study programme "Medicine"
Prerequisites	"Krok-1", - Necessary knowledge of: Latin and medical terminology, - medical biology, - medical informatics, - human anatomy, - physiology, - histology, cytology and embryology, - biological and bioorganic chemistry, - microbiology, virology and immunology, - pathomorphologist and her, - pathophysiological, - pharmacology, - pediatrics, - therapy, - general surgery.
Additional requirements	There are no specific requirements
Restrictions	There are no specific restrictions

3. Aims of the course

The purpose of the discipline is the formation and development of students' competence in the field of clinical medicine. Studying this discipline will help them get a holistic view of anaesthesiology and intensive care as an independent section of the clinical discipline, which studies and develops the theory and practice of protecting the body from extreme influences (aggression) and uses common methods to replace vital functions.

4. Contents

Topic 1 Cardiopulmonary and cerebral resuscitation (CPCR).

Development of resuscitation and intensive care in Ukraine and the world. Organization of resuscitation and intensive care in Ukraine. Terminal states. Causes of primary cardiac arrest. Stages of cardiopulmonary and cerebral resuscitation. Immediate stage of CPCR. Signs of clinical death. Causes of airway obstruction and methods of restoring their patency. Artificial lung ventilation. Indirect heart massage. Evaluation of the effectiveness of resuscitation measures. Specialized stage of CPCR. Types of circulatory arrest. The scope and justification of drug therapy during resuscitation, ways and methods of drug administration. ECG diagnosis of the type of circulatory arrest. Determination of indications for defibrillation and direct heart massage. Defibrillation techniques and safety rules when performing defibrillation. Stage III CPCR. Methods and means of assessing the condition and determining the possibility of saving the patient. Measures to restore brain function. Pathogenesis, clinical course of resuscitation disease. The concept of decortication, decerebration and brain death. Clinical features, biochemical and instrumental methods for determining brain death. The concept of euthanasia. The problem of life and death. Features of the doctor-resuscitator's relationship with the victim's relatives and specialists of related specialties. Intensive care of post-resuscitation disease.

Topic 2 General issues of anesthesiology.

Definition of anesthesiology as an independent scientific and practical medical discipline on anesthesia and management of vital functions of the body, its role and place in the modern system of medical specialties. Development of anesthesiology in Ukraine and the world. Organization of anesthesia in Ukraine. Anesthesia, its types. Theories of anesthesia. Classification of modern methods of anesthesia. Components and methods of anesthesia, main tasks: analgesia, inhibition or exclusion of consciousness, muscle relaxation, maintenance of adequate ventilation and gas exchange, blood circulation, metabolic processes. Inhalation anesthesia. Equipment and tools for inhalation anesthesia. Inhalation anesthetics: ether, fluorothane, nitrous oxide. Components of general anesthesia. Stages of anesthesia. Stages and clinic of anesthesia. Mask method of general anesthesia. Non-inhalation anesthesia. Drugs for non-inhalation anesthesia: ketamine, sodium thiopental, sodium oxybutyrate, propofol. Advantages and disadvantages. Stages and clinic of anesthesia. Regional anesthesia. Types and methods of regional anesthesia. Technique and methods of spinal puncture and catheterization of the epidural space. Features of general anesthesia in outpatient and emergency conditions. Choice of anesthesia method in emergency surgery. Features of preparation of patients for operation and anesthesia. Complications of general and regional anesthesia.

Topic 3 Methods of diagnosis and correction of disorders of water-electrolyte metabolism and acid-base status (ABS).

Physiological mechanisms of maintaining the internal environment of the organism, methods of its control. Pathophysiology of water-electrolyte metabolism and acid-base state. The concept of homeostatic functional system, molarity, osmolarity. Types of water metabolism disorders, their causes and methods of diagnosis and correction. Metabolism of basic electrolytes - sodium, potassium, chlorine, calcium - the causes of possible disorders, methods of correction. Physiological and buffer systems of ABS regulation. Types of acid-base disorders, methods of laboratory diagnosis and intensive care of metabolic acidosis, metabolic alkalosis, respiratory acidosis and respiratory alkalosis. Features of regulation of active reaction of an organism at children and elderly people. Methods for determining blood volume deficit. Characteristics of drugs - hemocorrectors, indications and contraindications to their use. Ways of introduction of infusion means, rules of carrying out infusion therapy. Features of infusion therapy in children and the elderly. Complications of infusion therapy. Basics of parenteral nutrition. Characteristics of drugs, rules of parenteral nutrition and control of its effectiveness.

Topic 4 Acute renal failure (ARF) and liver failure.

Anatomy and physiology of the urinary system. ARF, forms of ARF, pathophysiology, clinical course, physiological and biochemical disorders. Diagnostic methods. Intensive care (IT) algorithms at different stages of ARF. Methods of extrarenal cleansing (hemodialysis, hemofiltration, ultrafiltration, peritoneal dialysis). Etiological factors, pathophysiology of development, clinical course of acute liver failure. IT methods of acute liver failure.

Topic 5 Acute poisoning and comatose states.

The concept of acute poisoning. Classification of poisonings. General principles of intensive care in acute poisoning. Intensive therapy of acute poisoning by tranquilizers, barbiturates, opiates, organophosphorus substances, ethyl and methyl alcohols, carbon monoxide, acids and alkalis, poisonous fungi. Application of extracorporeal detoxification methods. Features of emergency care for insect and animal bites. Methods of differential diagnosis of comatose states. Determining the depth of the coma. Intensive care for comas of various etiologies (hypo-, hyperglycemic, hyperosmolar, hepatic, uremic). Intensive care of cerebral edema, convulsive and hyperthermic syndromes.

Topic 6 Acute respiratory failure (ARF).

Physiology and pathophysiology of respiration. Non-respiratory lung function. Anatomical and physiological features of the respiratory system in children and the elderly. Etiology and pathogenesis of ARF, classification, clinical course. Diagnostic algorithms. Hypoxia, its types, clinical signs, diagnosis. Hypercapnia, clinical signs. Means to ensure free airway patency and improve lung drainage function. Methods of oxygen therapy. Indications for the use of spontaneous breathing under constant positive pressure and artificial lung ventilation, contraindications and possible complications. Application of hyperbaric oxygenation. Features of intensive care in patients with acute respiratory failure.

Topic 7 Diseases and lesions of the respiratory system.

Intensive care of acute respiratory failure in some pathological conditions: in the postoperative period, asthma, pulmonary edema, drowning, thromboembolism of the pulmonary artery and its branches, aspiration syndrome, acute respiratory distress syndrome. Classification, etiology and pathogenesis, diagnosis and treatment of pneumonia.

Topic 8 Acute circulatory disorders.

Physiology and pathophysiology of blood circulation. Systemic oxygen transport as an indicator of the adequacy of cardiovascular function. Mechanisms of development of acute circulatory insufficiency. Determination of types of critical disorders of hemodynamics - heart and vascular insufficiency, hypovolemia. Criteria for microcirculation disorder. Causes, clinical manifestations and diagnosis of acute heart failure, heart rhythm disorders. The main directions of intensive care. Age features of the cardiovascular system and mechanisms of development of critical hemodynamic disorders and their treatment. Pathophysiology, diagnosis, features of the course and intensive care for dizziness and collapse.

Topic 9 Shock states.

Shock, types of shock. Pathophysiology, diagnosis, features of the intensive care for various types of shock (hemorrhagic, traumatic, burn, anaphylactic, septic). Features of infusion-transfusion therapy of different types of shock, characteristics of infusion solutions. Blood transfusion: indications, principles, complications. Traumatic shock. Pathogenesis, tactics of the victim with traumatic shock. Principles of infusion therapy in victims with traumatic shock. Burn shock. Features of intensive care of the victim with burn shock. Assessment of the need for antibiotics. Empirical and etiotropic administration of chemotherapeutics. Analysis of the degree of penetration of the antibiotic to the source of infection. Routes of administration, the frequency of administration of the antibacterial drug. Classification of antibacterial drugs. Antibacterial drugs aimed at hospital flora. Combinations of antibacterial agents. Prophylactic administration of antibiotics. Other methods of prevention of infectious complications.

Topic 10 Trauma disorders.

The most common lesions that occur in patients with traumatic disorders: polytrauma, traumatic brain injury, acute compartment syndrome. Pathophysiological processes in trauma. General principles of providing assistance to victims of severe injuries. Traumatic brain injury. Pathophysiology, diagnosis, features of the course, intensive care and measures to prevent complications in severe traumatic brain injury, polytrauma, acute compartment syndrome, electric trauma. Clinical manifestations and diagnosis of trauma. Monitoring and correction of intracranial pressure. Anesthesia and analgesia for patients with trauma. Thoracic trauma. Diagnosis of threatening conditions in thoracic trauma. Ventilation disorders in victims with chest trauma. Pulmonary contusion. Respiratory failure in victims with lung contusion. Skeletal injury: immobilization, anesthesia, principles of intensive care for victims with polyfracture. Fat embolism. Diagnostic criteria and intensive care.

5. Intended learning outcomes of the course

After successful study of the course, the student will be able to:

LO1	Acquire the skills of interviewing and clinical examination of the patient in critical condition, be able to determine the required list of laboratory and instrumental research and evaluate their results.
LO2	Be able to make a preliminary and clinical diagnosis of an emergency, determine the nature of nutrition in the treatment of serious diseases.
LO3	Make a differential diagnosis of the main syndromes that occur in the clinic of emergencies. Demonstrate skills in emergency medical care. Be able to determine the principles of treatment diseases. Demonstrate the performance of medical manipulations during the anesthesiological support of surgical interventions and intensive care.

LO4	Be able to determine the tactics of emergency medical care. Diagnose signs of clinical death and terminal conditions, to provide cardiopulmonary and cerebral resuscitation; apply basic algorithms of intensive care of emergencies.
LO5	Demonstrate the ability to carry out medical and evacuation measures. Plan, implement and analyze measures for the organization and integration of medical care to the population in natural disasters.
LO6	Be able to solve medical problems in new or unfamiliar environments with incomplete or limited information, taking into account aspects of social and ethical responsibility.
LO7	Be able to provide an examination of disability, demonstrate skills in forming of medical documents (including electronic forms) for patients in critical condition.
LO8	Demonstrate the ability to integrate knowledge of anesthesiology and intensive care and solve complex health problems in broad or multidisciplinary contexts.

6. Role of the course in the achievement of programme learning outcomes

Programme learning outcomes achieved by the course.

For 222 Medicine:

PO1	To detect and identify the leading clinical symptoms and syndromes (according to the List 1); to establish the most probable nosological or syndromic preliminary clinical diagnosis of diseases (according to the List 2) using standard methods, preliminary data of the patient's anamnesis, patient's examination data, and knowledge about a human, his organs and systems.
PO2	To collect information about the patient's general condition; to assess the patient's psychomotor and physical development and the state of organs and systems of the body; to assess information on the diagnosis (according to the List 4) based on laboratory and instrumental findings.
PO3	To order and analyze additional (mandatory and optional) examinations (laboratory, radiological, functional and/or instrumental) (according to the List 4) in order to perform a differential diagnosis of diseases (according to the List 2).
PO4	To establish a final clinical diagnosis at a medical institution under control of a supervising doctor by means of informed decision and logical analysis of the obtained subjective and objective data of clinical and additional examinations, and differential diagnosis, following the relevant ethical and legal norms (according to the List 2).
PO5	To detect the key clinical syndrome or the reason for patient's condition severity (according to the List 3) via informed decision and evaluation of the person's state under any circumstances (at home, in the street, at a healthcare facility), including under emergency and military operation conditions, in the field, with a lack of information and limited time.

PO6	To determine the nature and treatment principles (conservative, operative) in patients with diseases (according to the List 2) at a healthcare facility, at patient`s home or during medical evacuation process (including in the field), based on the provisional clinical diagnosis and observing the relevant ethical and legal norms, by making a reasonable decision according to existing algorithms and standard procedures based on the principles of evidence-based medicine; if needed to go beyond the standard scheme, to substantiate the personalized recommendations under control of a supervising doctor at a medical facility.
PO7	To determine an appropriate work and rest mode in the treatment of diseases (according to the List 2) at a healthcare institution, at patient`s home and during medical evacuation (including in the field), based on the provisional clinical diagnosis and observing the relevant ethical and legal norms, by making a reasonable decision according to existing algorithms and standard procedures.
PO8	To determine an appropriate diet in the treatment of diseases (according to the List 2) at a healthcare institution, at patient`s home and during medical evacuation (including in the field), based on the provisional clinical diagnosis and observing the relevant ethical and legal norms, by making a reasonable decision according to existing algorithms and standard procedures.
PO11	To determine the appropriate approach in emergency medical care case under any circumstances, adhering to the relevant ethical and legal norms, by making an informed decision based on the main clinical syndrome (disease severity) and emergency diagnosis (according to the List 3) using standard schemes under limited time conditions based on the principles of evidence-based medicine.
PO12	To provide emergency medical assistance under any circumstances, adhering to the relevant ethical and legal norms, by making an informed decision based on the main clinical syndrome (disease severity) and emergency diagnosis (according to the List 3) using standard schemes and predetermined approach under limited time conditions based on the principles of evidence-based medicine.
PO14	To perform medical procedures (according to the List 5) at a medical facility, at home or at work on the basis of a provisional clinical diagnosis and/or health parameters through making an informed decision and adhering to the relevant ethical and legal norms.
PO15	To perform procedures related to emergency medical assistance within a limited time and under any circumstances, using standard schemes on the basis of a medical emergency diagnosis (according to the List 3).
PO16	To plan and implement a system of sanitary and preventive measures against the occurrence and spread of diseases among the population.
PO18	To search for the necessary information in the professional literature and databases; to analyze, evaluate, and apply this information. To apply modern digital technologies, specialized software, statistical methods of data analysis to solve complex health problems.
PO19	To assess environmental impact on public health.

7. Teaching and learning activities

7.1 Types of training

Topic 1. Cardiopulmonary and cerebral resuscitation (CPCR).

pr.tr.1 "Development of resuscitation and intensive care in Ukraine and the world. Immediate and specialized stage of cardiopulmonary and cerebral resuscitation. Signs of clinical death." (full-time course)" (full-time course)

Organization of resuscitation and intensive care in Ukraine and the world. Stages of cardiopulmonary and cerebral resuscitation from the standpoint of evidence-based medicine. Terminal states. Causes of primary cardiac arrest. The scope and justification of drug therapy during resuscitation, ways and methods of drug administration. Indirect heart massage. Evaluation of the effectiveness of resuscitation measures. Specialized stage of CPCR. Types of circulatory arrest. The scope and justification of drug therapy during resuscitation, ways and methods of drug administration. ECG diagnosis of the type of circulatory arrest. Determination of indications for defibrillation and direct heart massage. Defibrillation techniques and safety rules when performing defibrillation. Causes of airway obstruction and methods of restoring their patency. Artificial lung ventilation. Practically oriented training: ensuring airway patency on the mannequin with the help of various devices (nasal, oropharyngeal airway, laryngeal mask, laryngeal tube, combi tube). Features of using the Ambu bag.

pr.tr.2 "III stage of cardiopulmonary and cerebral resuscitation. Methods and means of assessing the condition and determining the possibility of rescuing the patient. Intensive care of post-resuscitation disease. Intensive care of post-resuscitation disease" (full-time course)

Measures to restore brain function. Pathogenesis, clinical course of resuscitation disease. The concept of decortication, decerebration and brain death. Intensive care of postresuscitation disease: restoration of tissue perfusion, treatment of "low emission" syndrome, improvement of blood rheology; restoration of gas exchange; correction of metabolic disorders. Intensive care of cerebral edema from the standpoint of evidencebased medicine. Improving brain metabolism and eliminating reperfusion complications. Restoration of integrative function of the brain. Clinical signs, biochemical and instrumental methods for determining brain death. The concept of euthanasia. The problem of life and death. Features of the doctor-resuscitator's relationship with the victim's relatives and specialists in related specialties. Questions of deontology. Ethical and socio-legal issues. Practically oriented training: defibrillation techniques and safety rules when performing defibrillation with the help of a training defibrillator and a semi-automatic defibrillator Powerheart AED G3 Plus Automatic; carrying out basic and extended resuscitation measures on a mannequin.

Topic 2. General issues of anesthesiology.

pr.tr.3 "Development of anesthesiology in Ukraine and the world. Organization of anesthesia in Ukraine. Anesthesia, its types. Theories of anesthesia. Components and methods of modern anesthesia. Features of preparation of patients for surgery and anesthesia" (full-time course)

Definition of anesthesiology as an independent scientific and practical medical discipline on anesthesia and management of vital functions of the body, its role and place in the modern system of medical specialties. Development of anesthesiology in Ukraine and the world. Organization of anesthesia in Ukraine. Anesthesia, its types. Theories of anesthesia. Classification of modern methods of anesthesia. Components and methods of modern anesthesia, main tasks: anesthesia, inhibition or exclusion of consciousness, muscle relaxation, maintenance of adequate ventilation and gas exchange, blood circulation, metabolic processes. Complications of general and regional anesthesia. Occupational hazards in anesthesiology. Practically oriented training in the simulation center: consideration of the features of the structure of the main components of anesthesia-respiratory equipment on the example anesthesia and respiratory apparatus "DATEX".

pr.tr.4 "Inhalation anesthesia. Equipment and tools for inhalation anesthesia. Noninhalation anesthesia: technique, types of anesthetics. Regional anesthesia. Types and methods of regional anesthesia." (full-time course)

Inhalation anesthetics: ether, fluorothane, nitrous oxide. Components of general anesthesia. Stages of anesthesia. Stages and clinic of anesthesia. Mask method of general anesthesia. Features of regional anesthesia. Non-inhalation anesthesia. Drugs for non-inhalation anesthesia: ketamine, sodium thiopental, sodium oxybutyrate, propofol. Advantages and disadvantages. Stages and clinic of anesthesia. Regional anesthesia. Types and methods of regional anesthesia. Features of general anesthesia in outpatient and emergency conditions. Choice of anesthesia method in emergency surgery. Features of preparation of patients for operation and anesthesia. Practically oriented training in the simulation center: techniques and methods of spinal puncture and catheterization of the epidural space.

Topic 3. Methods of diagnosis and correction of disorders of water-electrolyte metabolism and acid-base status (ABS).

pr.tr.5 "Pathophysiology of water-electrolyte metabolism and acid-base state. Types of disorders of water metabolism, their causes and methods of diagnosis and correction. Types of disorders of acid-base state." (full-time course)

Physiological mechanisms of maintaining the internal environment of the organism, methods of its control. Pathophysiology of water-electrolyte metabolism and acid-base state. Types of water metabolism disorders, their causes and methods of diagnosis and correction. Metabolism of basic electrolytes - sodium, potassium, chlorine, calcium - the causes of possible violations, methods of correction from the standpoint of evidence-based medicine. Physiological and buffer systems of ABS regulation. The concept of homeostatic functional system, molarity, osmolarity. Metabolism of basic electrolytes - sodium, potassium, chlorine, calcium - the causes of possible disorders, methods of correction. Physiological and buffer systems of ABS regulation. Types of acid-base disorders, methods of laboratory diagnosis and intensive care of metabolic acidosis, metabolic alkalosis, respiratory acidosis and respiratory alkalosis from the standpoint of evidence-based medicine. Practically oriented training in the simulation center: analysis of blood gases of patients with ABS disorders.

pr.tr.6 "Principles of infusion therapy. Basics of parenteral nutrition" (full-time course)

Methods for determining the blood volume deficit. Characteristics of drugs - hemocorrectors, indications and contraindications to their use. Ways of infusion, rules of infusion therapy. Features of infusion therapy in children and the elderly. Complications of infusion therapy. Characteristics of drugs, rules of parenteral nutrition and control over its effectiveness. Features of parenteral nutrition in children and the elderly. Practically oriented training in the simulation center: measurement of central venous pressure, calculation of the infusion therapy program per day for patients with impaired water-electrolyte metabolism. Calculation of components for parenteral nutrition of the patient depending on the age and weight of the patient.

Topic 4. Acute renal failure (ARF) and liver failure.

pr.tr.7 "Acute renal failure. Extracorporeal detoxification methods. Acute liver failure" (full-time course)

Anatomy and physiology of the urinary system. ARF, forms of ARF, pathophysiology, clinical course, physiological and biochemical disorders. Diagnostic methods. Intensive care (IT) algorithms at different stages of ARF from the standpoint of evidence-based medicine. Methods of extrarenal detoxication (hemodialysis, hemofiltration, ultrafiltration, peritoneal dialysis). Practically oriented training in the simulation center: setting up a system for peritoneal dialysis. Types of dialysis solutions. Etiological factors, pathophysiology of development, clinical course of acute liver failure. Methods of intensive care of acute liver failure from the standpoint of evidence-based medicine. Consideration of the principle of extracorporeal detoxification of blood in the "artificial liver" mode using the PROMETHEUS system.

Topic 5. Acute poisoning and comatose states.

pr.tr.8 "Differential diagnosis of comatose states. Methods of differential diagnosis of comatose states and intensive care for insects of various etiologies." (full-time course)

Methods of differential diagnosis of comatose states. Determining the depth of the coma. Intensive care for insects of various etiologies (hypo-, hyperglycemic, hyperosmolar, hepatic, uremic) from the standpoint of evidence-based medicine. Practically oriented training in the simulation center: assessment of the degree of disturbance of consciousness on the Glasgow scale. Methods of differential diagnosis of comatose states. Determining the depth of the coma. Intensive care for insects of various etiologies (hypo-, hyperglycemic, hyperosmolar, hepatic, uremic) from the standpoint of evidence-based medicine. Therapy of cerebral edema, convulsive and hyperthermic syndromes from the standpoint of evidence-based medicine. Practically oriented training in the simulation center: consideration of blood gas tests of patients with hyperglycemic ketoacidotic coma.

pr.tr.9 "The concept of acute poisoning. Intensive care of acute poisoning" (full-time course)

Classification of poisonings. General principles of intensive care in acute poisoning. Intensive therapy of acute poisoning by tranquilizers, barbiturates, opiates, organophosphorus substances, ethyl and methyl alcohols, carbon monoxide, acids and alkalis, poisonous fungi (from the standpoint of evidence-based medicine). Practically oriented training in the simulation center: selection of the size of the gastric tube and the rules of its use for gastric lavage. Testing the introduction of a gastric tube on a mannequin. Preparation of solutions for gastric lavage.

Topic 6. Acute respiratory failure (ARF).

pr.tr.10 "Physiology and pathophysiology of respiration system. Hypoxia, its types, clinical signs, diagnosis and treatment. Methods of oxygen therapy" (full-time course)

Physiology and pathophysiology of respiration. Non-respiratory lung function. Anatomical and physiological features of the respiratory system in children and the elderly. GDN diagnostic algorithms. Hypoxia, its types, clinical signs, diagnosis. Hypercapnia, clinical signs. Etiology and pathogenesis of GDN, classification, clinical course. Methods of intensive care of ARF from the standpoint of evidence-based medicine. Methods of oxygen therapy. Indications for the use of spontaneous breathing under constant positive pressure and mechanical lung ventilation, contraindications and possible complications. Practically oriented training in the simulation center: intubation of the trachea on a mannequin, selection of the size of the intubation tube. Consideration of the basic elements of the breathing apparatus "Newport 360". Work with Venturi oxygen mask, nasopharyngeal and oropharyngeal oxygen masks.

Topic 7. Diseases and lesions of the respiratory system.

pr.tr.11 "Intensive care of acute respiratory failure in certain pathological conditions. Classification, etiology and pathogenesis, diagnosis and treatment of pneumonia. Features of the system of extracorporeal membrane oxygenation (ECMO)." (full-time course)

Intensive care of acute respiratory failure in some pathological conditions: in the postoperative period, asthma, pulmonary edema, drowning, pulmonary embolism, aspiration syndrome, acute respiratory distress syndrome from the standpoint of evidence-based medicine. Classification, etiology and pathogenesis, diagnosis, differential diagnosis and treatment of pneumonia. Features of treatment of viral pneumonia, in particular caused by Covid19 virus, from the standpoint of evidence-based medicine. Principles of extracorporeal membrane oxygenation (ECMO) apparatus operation. Indications and contraindications to ECMO. Hyperbaric oxygenation (HBO). Pathophysiological mechanisms of action of oxygen on the body under high pressure. Rules and features of use of HBO devices.

Topic 8. Acute circulatory disorders.

pr.tr.12 "Physiology and pathophysiology of blood circulation. Acute heart failure. Modern treatment of acute coronary syndrome." (full-time course)

Physiology and pathophysiology of blood circulation. Systemic oxygen transport as an indicator of the adequacy of cardiovascular function. Mechanisms of development of acute circulatory insufficiency. Determination of types of critical hemodynamic disorders - heart and vascular insufficiency, hypovolemia. Criteria for microcirculation disorder. Cardiogenic shock: etiological factors, pathophysiological mechanisms, clinical forms. Principles of treatment of cardiogenic shock from the standpoint of evidence-based medicine. Indications and contraindications to balloon counterpulsation. Causes, clinical manifestations and diagnosis of acute heart failure, heart rhythm disorders. The main directions of intensive care. Age features of the cardiovascular system and mechanisms of development of critical hemodynamic disorders and their treatment. Pathophysiology, diagnosis, features of the course and intensive care for dizziness and collapse from the standpoint of evidence-based medicine. Conservative treatment of acute coronary syndrome from the standpoint of evidence-based medicine. Types of cardiac interventions: balloon angioplasty, stenting, aorto-coronary shunting. Indications, contraindications, possible complications. Features of anesthesiological support of such intervention.

Topic 9. Shock states.

pr.tr.13 "Clinic, diagnosis, treatment of shock of various etiologies. Intensive care for different types of shock. Traumatic shock." (full-time course)

Shock, the types of shock. Pathophysiology, diagnosis, features of the course, intensive care for various types of shock (hemorrhagic, traumatic, burn, anaphylactic, septic) from the standpoint of evidence-based medicine. Features of infusion-transfusion therapy of different types of shock, characteristics of infusion solutions. Blood transfusion: indications, principles, complications. Traumatic shock. Pathogenesis, tactics in victims with traumatic shock. Principles of infusion therapy in victims with traumatic shock. Practically oriented training in the simulation center: determination of indications and contraindications for transfusion of blood components, filling in the blood transfusion card, determination of blood group with the help of reagents Celiklon anti-A, Celiklon anti-B.

pr.tr.14 "Intensive care of burn disease. Burn shock. Assessment of the need for antibiotics. Empirical and etiotropic administration of chemotherapeutics." (full-time course)

Periods of burn disease. Burn shock. Features of intensive care of the victim with burn shock from the standpoint of evidence-based medicine. Analysis of the degree of penetration of the antibiotic to the source of infection. Routes of administration, the frequency of administration of the antibacterial drug. Classification of antibacterial drugs. Antibacterial drugs aimed at hospital flora. Combinations of antibacterial agents. Prophylactic administration of antibiotics. Other methods of prevention of infectious complications. Practically oriented training in the simulation center: Calculation of doses of transfusion drugs (erythrocyte mass, albumin, fresh-frozen plasma, thromboconcentrate). Working out of various ways (intravenous, intramuscular, hypodermic) introduction of drugs on models. Principles of intravenous catheter insertion and infusomat use.

Topic 10. Trauma disorders.

pr.tr.15 "Pathophysiological processes in trauma. Traumatic brain injury: clinic, diagnosis, treatment. Thoracic and skeletal trauma" (full-time course)

Pathophysiological processes in trauma. General principles of providing assistance to victims of severe injuries. Traumatic brain injury. Pathophysiology, diagnosis, features of the course, intensive care and measures to prevent complications in severe traumatic brain injury, polytrauma, long-term compression syndrome, electrotrauma from the standpoint of evidence-based medicine. Clinical manifestations and diagnosis of trauma. Monitoring and correction of intracranial pressure. Anesthesia and analgesia for patients with trauma. Thoracic trauma. Diagnosis of threatening conditions in thoracic trauma. Ventilation disorders in victims with chest trauma. Pulmonary contusion. Respiratory failure in victims with lung contusion. Skeletal trauma: immobilization, anesthesia, principles of intensive care for victims with polyfracture. Fat embolism. Prolonged compression syndrome. Diagnostic criteria and intensive care from the standpoint of evidence-based medicine. Practically oriented training in the simulation center: applying bandages on the model with various injuries of the brain and facial skull. Methods of lumbar puncture. Consideration of cerebrospinal fluid analysis in normal and in pathology. Measurement of cerebrospinal fluid pressure using the Waldman apparatus. Puncture of the pleural cavity with tension pneumothorax on a mannequin, application of an occlusive (sealing) bandage.

7.2 Learning activities

LA1	Preparing for Krok 2.
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LA2	Preparation of multimedia presentations.
LA3	Preparation for the seminar.
LA4	Preparation for training.
LA5	Watching educational films.
LA6	Creation and presentation of material using educational platforms Google Meet and Mix learning.
LA7	Self-study.
LA8	Practice of practical skills in the simulation center.
LA9	Interpretation of laboratory (clinical analysis of blood, urine, biochemical analysis of blood, immunological tests, etc.) and instrumental (ECG, echocardiography, EFGDS, ultrasound, CT, radiography, spirometry, etc.) examination methods.
LA10	Individual research project (student research paper, article, thesis, etc.)
LA11	Practical work with the patient in the specialized departments of the hospital.

8. Teaching methods

Course involves learning through:

TM1	Interactive lectures.
TM2	Case-study
TM3	Demonstration method.
TM4	Practice-oriented learning.
TM5	Trainings in the active mode.
TM6	Educational discussion / debate.
TM7	Brain storm

Ability to establish a preliminary and clinical diagnosis of the disease. Ability to determine the principles and nature of disease treatment and medical manipulations.

1. Ability to abstract thinking, analysis and synthesis. 2. Ability to learn, master modern knowledge and apply them in practical situations. 3. Knowledge and understanding of the subject area and understanding of professional activity. 4. Ability to adapt and act in a new situation. 5. Ability to make informed decisions; work in a team; interpersonal skills. 7. Ability to use information and communication technologies 8. Definiteness and persistence in terms of tasks and responsibilities.

9. Methods and criteria for assessment

9.1. Assessment criteria

ECTS	Definition	National scale	Rating scale
	Outstanding performance without errors	5 (Excellent)	$170 \leq RD \leq 200$
	Above the average standard but with minor errors	4 (Good)	$140 \leq RD < 169$

	Fair but with significant shortcomings	3 (Satisfactory)	$120 \leq RD < 139$
	Fail – some more work required before the credit can be awarded	2 (Fail)	$0 \leq RD < 119$

9.2 Formative assessment

FA1	Diagnostic testing.
FA2	Defense of presentations and abstracts.
FA3	Interviews and oral comments of the teacher on his results.
FA4	Checking and evaluating written assignments.
FA5	Solving situational tasks.
FA6	Defense of an individual research project (speech at a conference, competition of scientific works).

9.3 Summative assessment

SA1	Evaluation of written works, surveys, solving a clinical case.
SA2	Testing.
SA3	Final control: practice-oriented exam (according to the regulations).
SA4	Defense of an individual research project (incentive activities, additional points).

Form of assessment:

11 semester		200 scores
SA1. Evaluation of written works, surveys, solving a clinical case.		100
		100
SA2. Testing.		20
		20
SA3. Final control: practice-oriented exam (according to the regulations).		80
	Answer to theoretical questions (3x15)	45
	Execution of a practical task.	15
	Providing emergency care.	20

Form of assessment (special cases):

11 semester		200 scores
SA1. Evaluation of written works, surveys, solving a clinical case.		100
	In the case of quarantine restrictions, the implementation of individual calculation and analytical tasks is carried out remotely using the Mix learning platform.	100
SA2. Testing.		20

	In case of quarantine restrictions, the evaluation of written works is carried out remotely using the Mix learning platform.	20
SA3. Final control: practice-oriented exam (according to the regulations).		80
	In case of quarantine restrictions, practical classes are conducted remotely using the platform Mix learning, Zoom, Google meet.	80

The student is assigned to each practical lesson maximum 5 points (score is set according to the traditional 4-point grading system) during the mastering of module materials. At the end of the school year, the arithmetic mean of student performance is calculated. The maximum number of points that a student can receive in practical classes during academic year - 100. The number of student points is calculated by the formula 100 multiplied to the arithmetic mean and divide by 5. For diagnosis testing the student receives a maximum of 20 points. The minimum number of points you need to score get a student - 12 points. The maximum number of points for the current educational activity student - 120. The student is admitted to the exam subject to the requirements of the academy program and if for the current educational activity he scored at least 72 points: 60 points during practical classes and 12 points for testing. Practically-oriented exam is held on schedule at the end of the semester. Exam tickets contain 3 theoretical questions on different topics and cover all sections of the discipline (15 points), 1 practical task (15 points) and the issue of emergency care (20 points). The exam is credited to the student if he scored at least 48 points out of 80. Incentive points are added to the grade in the discipline for implementation of an individual research project (defense of student research work 12 points, speech at the conference 5 points, poster speech at the conference 4 points, thesis reports 3 points). The total score in the discipline may not exceed 200 points.

10. Learning resources

10.1 Material and technical support

MTS1	Library funds.
MTS2	Computers, computer systems and networks.
MTS3	Models and mannequins - a simulation center on the basis of the Department of Emergency Medicine of Sumy State University (mannequins-simulators and torsos for cardiopulmonary resuscitation, training defibrillator in full, full-length mannequins with feedback for cardiomonitoring, automation and external defibrillation, drug resuscitation, models for testing the technique of intravenous and intramuscular administration of drugs, means to ensure airway patency - laryngeal masks, laryngeal and intubation tubes, laryngoscope, combi tube, nasal and oropharyngeal airways).
MTS4	Medical facilities / premises and equipment: simulation center on the basis of the Department of Emergency Medicine of Sumy State University; medical and diagnostic equipment (electrocardiograph, bronchoscope, gastroscope, X-ray equipment, respiratory and anesthesiological equipment, defibrillator) on the basis of Sumy Regional Paediatric Hospital.
MTS5	Multimedia, video and audio, projection equipment (video cameras, projectors, screens, smart boards, etc.)

MTS6	Distance learning software - use of Mix learning platforms (for providing electronic lecture notes and testing) and Google Meet (for online lectures and surveys).
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10.2 Information and methodical support

Essential Reading	
1	Paul G.Barash, Bruce F. Cullen Clinical anesthesia. LWW; 8 th Edition, 2017.
2	Jean-LouisVincen, Edward Abraham Textbook of critical care. Elsevier; 7th Edition,2017.
3	Annual Update in Intensive Care and Emergency Medicine 2017 [Електронний ресурс] / edited by Jean-Louis Vincent. — 1st ed. 2017. — Cham : Springer International Publishing, 2017. — XI, 545 p. 55 illus. DOI: 10.1007/978-3-319-51908-1
Supplemental Reading	
1	Edward Scarth Drugs in anesthesia and intensive care. 5 th Revised Edition, 2016.
2	Clinical Anesthesia [Електронний ресурс] : Near Misses and Lessons Learned / J. Brock-Utne ; by John G. Brock-Utne. — 2nd ed. 2017. — Cham : Springer International Publishing, 2017. — XVII, 342 p. DOI: 10.1007/978-3-319-71467-7
3	Tkachenko Y, Redko C, Kashan S, Introduction to infusion therapy. Sumy state university, 2021. 167 p.
4	Anesthesiology [Електронний ресурс] : Clinical Case Reviews / edited by Linda S. Aglio, Richard D. Urman. — 1st ed. 2017. — Cham : Springer International Publishing, 2017. — XV, 493 p. 19 illus., 13 illus. in color. DOI: 10.1007/978-3-319-50141-3
Web-based and electronic resources	
1	World Health Organization in Ukraine. [Electronic resource] - access mode https://www.who.int/countries/ukr/ru/
2	European Resuscitation Council. [Electronic resource] - access mode https://www.erc.edu
3	European Association of Anesthesiologists [Electronic resource] - access mode http:// www.euroanesthesia.org
4	English text database of medical and biological publications [Electronic resource] - access mode http://www.pubmed.com
5	English - language web resource for physicians and other health care professionals [ELECTRONIC RESOURCES] ht tps: // emedicine.medscape.com