

**MINISTRY OF HEALTH PROTECTION OF UKRAINE
O DESKA NATIONAL MEDICAL UNIVERSITY**

**Faculty medical number 1
Department of Anesthesiology, intensive care and emergency medicine**

**Syllabus of the elective educational discipline
"Infusion and transfusion therapy in intensive care"**

Amount	90 hours (3 credits)
Semester, year of study	IX - X semesters, 5th year of study
Days, time, place	The educational discipline is conducted according to the approved class schedule Clinical bases of the department - ORH, Center of Reconstructive and Restorative Medicine (University Clinic
Teacher(s)	Associate professor, MD Inna Serhiyivna Hrychushenko Associate professor, MD Volodymyr Mykhailovych Nosenko Associate professor, MD Lyudmila Oleksiivna Sobitnyak Assistant Yurii Oleksandrovych Potapchuk Assistant Hanna Oleksandrivna Danylova Assistant Denis Serhiyovych Volodychev Assistant Oleksandr Olegovich Korotkov
Contact phone number	Hrychushenko I.S. 093-797-13-53 Nosenko V.M. 050-628-42-98 Sobitnyak L.O. 097-207-76-23 Potapchuk Yu.O. 093-305-24-51 Danylova G.O. 066-286-01-68 Volodychev D.S. 096-797-59-79 Korotkov O.O. 093-911-24-57
E-mail	Hrychushenko I.S. sherlokfox@gmail.com Nosenko V.M. volodymyrnosenko@gmail.com Sobitnyak L.O. ludmilasobitniak@gmail.com Yu.O. Potapchuk dr.potapchuck@gmail.com Danylova G.O. emergencyanna@gmail.com Volodychev D.S. denis.volodychev@onmedu.edu.ua Korotkov O.O. sashakorotkov58@gmail.com
	ORH base

Workplace	Center of Reconstructive and Restorative Medicine (University Clinic)
Consultations	Face-to-face consultations: Thursday – from 2:00 p.m. till 4:00 p.m.; Saturday - from 9.00 till 13.00. Online consultations: Thursday - from 14:00 till 16:00; Saturday - from 9.00 till 13.00 Microsoft Teams or through Telegram/Viber . The link to the online consultation is provided to each group during classes separately.

COMMUNICATION

Communication with the applicant will be carried out in the classroom (face-to-face).

During distance learning, communication is carried out through the Microsoft platform Teams , as well as e-mail correspondence, Telegram/Viber messengers (through created groups, separately through the head of the group).

ABSTRACT OF THE EDUCATIONAL DISCIPLINE

Subject of discipline study

The subject of study of the educational discipline "Infusion-transfusion therapy in intensive care" is: clinical physiology and disorders of water-electrolyte exchange and acid-base status; indications, rules of conduct, rationality of use, side effects and complications of infusion therapy; effectiveness and safety of infusion therapy in various pathological conditions; basics of hematopoiesis and functional properties of blood cells; use of blood components and preparations in medicine; pathophysiology and principles of intensive therapy of blood loss in patients with various pathologies; risks and complications associated with blood transfusion; ethical and legal aspects of transfusiology; the issue of donation in Ukraine.

Course prerequisites and post-requisites (The place of the discipline in the educational program)

Intensive therapy, as a science, is closely related to other fundamental medical disciplines and:

a) is based on the study of human anatomy; histology, biochemistry, physiology, pathomorphology; pathophysiology; internal medicine, pediatrics, pharmacology and integrates with these disciplines, etc.;

b) lays the foundations for students to study intensive care of emergency conditions that arise in the clinic of internal medicine, pediatrics, surgery, traumatology and orthopedics, neurosurgery, urology, obstetrics and gynecology and other educational disciplines where methods are used intensive care, which involves the integration of teaching with these disciplines and the formation of skills to apply knowledge in the process of further education and professional activity;

c) provides an opportunity to acquire practical skills and develop professional skills for diagnosis and provision of emergency medical care and intensive therapy for certain pathological conditions.

Purpose of the discipline:

Acquisition by the student of higher education of knowledge and formation of elements of professional competences in the field of intensive therapy and improvement of skills and competences acquired during the study of previous disciplines.

With discipline:

- mastering the basic measures necessary for the organization of work in the intensive care unit
- acquiring practical skills for providing medical assistance in emergency situations
- acquisition of practical skills for preparation and implementation of infusion therapy and transfusion of donor blood components;
- acquisition of skills and abilities to examine the patient and record the results in the relevant medical documentation;
- formation of moral and ethical and deontological qualities during professional communication with the patient.

Expected results:

As a result of studying the academic discipline, the applicant must:

Know:

- The basics of organizing a rational regime and treating a patient in the intensive care unit;
- General elements of patient care in the intensive care unit;
- Clinical physiology of water-electrolyte exchange and acid-base status;
- Violation of water and electrolyte metabolism in the intensive care clinic;
- General characteristics of basic solutions, liquids for infusion and transfusion therapy;
- Pathological conditions and syndromes in which infusion therapy is used;
- Basics of hematopoiesis and functional properties of blood cells;
- Immunological basis of transfusion therapy;
- Indications for transfusion therapy in clinical practice;
- Duties of a doctor and a nurse during infusion and transfusion therapy, organization and procedure;
- Hemotransfusion reactions and complications, methods of their prevention and treatment;
- Violation of blood circulation. Shocks

Be able:

1. Calculation of the need for liquid, volume and rate of infusion in adults and children
2. Clinical criteria for assessing the patient's volemic state during physical examination
3. Determination of the blood group according to the ABO system using tsoliclons
4. Assessment of suitability of hemotransfusion fluids
5. Testing for individual compatibility by blood group, Rh factor, biological test
6. Methodology for calculating the total volume of transfusion therapy in acute blood loss
7. Preparation of medical documentation related to infusion and transfusion therapy
8. Administration of medicinal substances (intravenous jet and drip, intraosseous), in particular in field conditions
9. Provision of peripheral venous and intraosseous access
10. Transfusion of blood components and blood substitutes
11. Calculation of parenteral nutrition
12. Diagnosis and provision of first medical and medical aid in case of:
 - Hypovolemic, distributive variants of shock
 - Acute vascular insufficiency (collapse)
 - Acute blood loss (external and internal)

DESCRIPTION OF THE EDUCATIONAL DISCIPLINE

Forms and methods of education

The discipline will be taught in the form of practical classes (30 hours), organization of the applicant's independent work (60 hours).

Teaching methods : practical classes, independent work of the acquirer

- **Practical classes:** conversation, role-playing, solving clinical situational problems, practicing the skills of patient examination, practicing the skills of performing manipulations according to the list, instruction and practicing skills on simulation dummies, training exercises on the differential diagnosis of the most common diseases. The teacher uses interactive teaching methods such as "Microphone", "Unfinished sentence", "Discussion", "Method of competitive groups", "Brainstorming", "Case", etc.
- **Independent work of the applicant** with the active consultation of the teacher: independent work with the recommended basic and additional literature, with electronic information resources, independent work with the bank of test tasks Step-2, independent mastering of the algorithms of communication with the patient.

Content of the academic discipline

Topic 1. Clinical physiology of water-electrolyte metabolism, acid-base status and their disorders

Water content in the body and its distribution, regulation of water-electrolyte

exchange. Calculation of the patient's need for fluid, calculation of the infusion that provides physiological fluid needs, clinical criteria for assessing the patient's volemic state during physical examination, distribution of various solutions by water sectors of the body. Exchange of sodium, potassium, calcium, chlorine, magnesium, phosphorus, their disorders and correction. Metabolic and respiratory acidosis and alkalosis.

Topic 2. Infusion therapy: classification of infusion solutions and their characteristics

Functional classification of infusion drugs (groups, subgroups, drugs). Characteristics of solutions for infusion therapy: crystalloids, colloids, polyatomic alcohols, drugs of special action. Advantages and disadvantages, indications and contraindications.

Topic 3. Infusion therapy: indications and rules of conduct, side effects and complications

Indications and rules for infusion therapy: fluid resuscitation, provision of physiological needs for fluid and electrolytes, replenishment of fluid and electrolyte deficits, redistribution of fluid in the body, special situations.

Adverse events and complications: hyperhydration, electrolyte disturbances, anaphylaxis, acute renal failure, cerebral edema, hypothermia, coagulopathy, complications associated with intravascular access.

Topic 4. Infusion therapy: rationality of use

Liberal and restrictive strategy of infusion therapy. Rational use of infusion therapy depending on the patient's condition, type of disease and concomitant diseases. Restoration of fluid volume during dehydration, elimination of metabolic disorders, improvement of blood rheology, correction of hemostasis, restoration of VEO and COS, treatment of pain syndrome and hyperthermia, energy support, detoxification therapy, etc.

Topic 5. Pathological conditions and syndromes in which infusion therapy is used

Use of infusion therapy in metabolic and respiratory alkalosis, acidosis, water-electrolyte metabolism disorders, hypovolemia, blood loss, intoxication syndrome, infectious diseases, cardiopulmonary resuscitation, acute coronary syndrome, complications of diabetes, ischemic stroke, burn disease, poisoning, thermoregulation disorders, disorders of blood rheology, sepsis, pancreatic necrosis, microcirculation disorders, etc.

Topic 6. Effectiveness and safety of infusion therapy

Understanding of indications and contraindications for prescribing infusions, the type and composition of the infusion medium, the final purpose of infusion, potential side effects of drugs, prevention of complications. Taking into account the age and history of the patient, control of dosage, rate and volume of infusions, route of administration; a rational combination of various infusion agents. Monitoring during

infusion therapy (clinical and laboratory).

Topic 7. Basics of hematopoiesis and functional properties of blood cells

Blood is a functional system of the body, the composition of the blood system. Clinical analysis of hemogram, main parameters of quantitative and qualitative characteristics of blood cells. Factors of bone marrow functioning. Immunological foundations of transfusion therapy, structure of the immune system and mechanisms of functioning of the immune defense system.

Topic 8. Blood components and preparations and their use in medicine.

Mechanism of action of transfused blood

General characteristics of hemotransfusion media: whole and preserved blood, preservative solutions; fractionation of preserved blood into its components (plasma, erythrocytes, platelets, leukocytes) and their preservation; fractionation of preserved blood for the preparation of erythrocyte mass and plasma. Platelet and leukocyte concentrates, erythrocyte mass and washed erythrocytes. Plasma, plasma proteins, medicinal forms of plasma proteins, proteins of the blood coagulation system.

Organizational principles of transfusions of blood and its components. Clinical indications for the use of SZP, cryoprecipitate, therapeutic properties of albumin. Phases of changes in the body after hemotransfusions. Technique of transfusion of blood and its components.

Topic 9. Blood loss: classifications, pathophysiology, determination of the amount and severity of blood loss

Classification of blood loss and bleeding. Degrees of hypovolemia, methods of assessment of BCC deficit. Methods of determining the volume and severity of blood loss; queues of urgency for examination of the patient. Mechanisms of pathological disorders arising during blood loss; compensatory phenomena that occur in the body. Processes of hemostatic reactions associated with blood loss. DVZ-syndrome.

Topic 10. Blood loss: principles of intensive therapy of blood loss

Tasks and functional algorithm of intensive therapy of acute blood loss. Protocols of infusion-transfusion therapy for various degrees of hemorrhagic shock. Clinical and laboratory monitoring of the patient's condition during transfusion therapy. Alternatives to transfusion of donor blood.

Topic 11. Basic principles and measures of transfusion therapy in patients with various diseases

Transfusion therapy in patients with surgical pathology, burn disease. Blood conservation in victims with combined trauma. Limitation of blood loss in obstetrics and gynecology and methods of reducing hemotransfusions. Problems of blood loss in neurosurgical patients. Infusion-transfusion therapy for sepsis. Combat injury.

Perioperative management of patients with anemia. The risk of hemotransfusion in cancer patients.

Topic 12. Risks associated with blood transfusion, complications, contraindications

Immunological incompatibility and reactions not associated with incompatibility according to the ABO system. Basic methods of preventing immune hemolytic reactions. The danger associated with infectious diseases, the risk of infection with bacteria, viruses, hemotransmissible infections. Hemotransfusion risk caused by donor leukocytes: alloimmunization, immunological effects, febrile reactions, "transplant rejection" and others. The risk of technical errors in transfusions.

Post-transfusion complications (classification); complications associated with violation of the technology of collection, storage, processing and transfusion of blood, its components and drugs. Contraindications for transfusion.

Topic 13. Ethical and legal aspects of transfusiology

Concept of medical ethics and morality. Patient rights: receiving information, informed consent, confidentiality, autonomy, freedom of choice, right to refuse treatment. Knowledge of the Law of Ukraine "Basics of the legislation of Ukraine on health care", the Law of Ukraine "On the rights of patients in Ukraine".

List of recommended literature:

Basic literature:

1. Kostenko V.O. Pathophysiology of the blood system: education. manual. Magnolia Publishing House, 2020. 164 p.
2. Orlyk V.V. Transfusion medicine: a textbook. "Medytsina" publishing house, 2023. 424 p.
3. Potapov O.O., Rubanets M.M., Kmyta O.P. Clinical aspects of transfusion: teaching. manual. Sumy, 2019. 396 p.
4. Research methods in hematology: study guide / edited by Professor L.N. Seizures Sumy, 2019. 55 p.
5. Research methods in hematology: study guide / edited by Professor L.N. Seizures Sumy, 2019. 55 p.

Auxiliary:

1. Bilayaeva A.V. The patient's hemomanagement program: training. manual. Kyiv-Vinnytsia, 2019. 68 p.
2. Clinical laboratory diagnostics: a textbook / Lapovets L.E., Lebed G.B., Yastremska O.O, etc. - 2nd ed. Kyiv, 2021. 472 p.
3. Katerenchuk I. Clinical interpretation and diagnostic value of laboratory indicators in general medical practice: training. manual. Medknyga Publishing House, 2020. 228 p.

4. Onopriychuk D.V., Maligonova A.I. Synopsis of gastroenterology and hematology: study guide. Ruta Publishing House, 2022. 348 p.

Electronic information resources

1. <https://moz.gov.ua/> - Ministry of Health of Ukraine, register of medical and technological documents
2. <http://www.nbu.gov.ua/> - National Library of Ukraine named after V.I. Vernadskyi
3. <http://www.esicm.org>
5. <https://www.cochrane.org> - Cochrane - library: Cochrane Reviews - Cochrane database of systematic reviews
6. <http://www.nlm.nih.gov/> US National Library of Medicine (NLM) IResources for researchers / Biomedical literature
7. <https://www.ncbi.nlm.nih.gov/> - NCBI - National Center for Biotechnology Information
8. <http://www.pubmed.gov> I PubMed is an electronic database of medical and biological publications
9. <http://www.library.gov.ua/> National Scientific Medical Library of Ukraine
10. <http://testcentr.org.ua/> Testing Center of the Ministry of Health of Ukraine
11. <http://www.pubmed.com/> English text database of medical and biological publications
12. <https://emedicine.medscape.com/> English-language web resource for doctors and other healthcare professionals
13. <http://www.esicm.org> Official website of the European Association of Intensive Care
14. <http://www.espen.org> The official website of the European Association of Parenteral and Enteral Nutrition
15. <http://www.ncbi.nlm.nih.gov/PubMed/> Search resource of medical literature and "PubMed"

EVALUATION

Forms and methods of control:

Current control:

tests of the initial and final level of knowledge on the topic of practical training;
oral answer to standardized questions based on the material of the current topic, previous topics and lecture material;
solving typical and atypical clinical situational problems;
control of practical skills;
control of the acquirer's activity while working in small groups.

Final control: credit.

Evaluation of the current educational activity in a practical session:

1. Evaluation of theoretical knowledge on the subject of the lesson:
 - methods: survey, solving a situational clinical problem

- the maximum score is 5, the minimum score is 3, the unsatisfactory score is 2.
2. Evaluation of practical skills and manipulations on the subject of the lesson:
- methods: assessment of the correctness of the performance of practical skills
 - the maximum score is 5, the minimum score is 3, the unsatisfactory score is 2.
- The grade for one practical lesson is the arithmetic average of all components and can only have a whole value (5, 4, 3, 2), which is rounded according to the statistical method.

Current evaluation criteria in practical training

Rating	Evaluation criteria
"5"	The graduate of high education is fluent in the material, takes an active part in discussing and solving a situational clinical problem, confidently demonstrates practical skills during the examination of a patient and the interpretation of clinical, laboratory and instrumental research data, expresses his opinion on the topic of the class, demonstrates clinical thinking.
"4"	The graduate of high education has a good command of the material, participates in the discussion and solution of a situational clinical problem, demonstrates practical skills during the examination of a patient and the interpretation of clinical, laboratory and instrumental research data with some errors, expresses his opinion on the topic of the class, demonstrates clinical thinking.
"3"	The graduate of high education acquirer does not have sufficient knowledge of the material, is unsure of participating in the discussion and solution of the situational clinical problem, demonstrates practical skills during the examination of the patient and the interpretation of clinical, laboratory and instrumental research data with significant errors.
"2"	The graduate of high education does not possess the material, does not participate in the discussion and solution of the situational clinical problem, does not demonstrate practical skills during the examination of the patient and the interpretation of clinical, laboratory and instrumental research data.

The credit is given to the graduate of high education who has completed all the tasks of the working program of the educational discipline, took an active part in practical classes, completed and defended an individual task and has an average current score of not less than 3.0 and has no academic debt.

The credit is carried out: at the last class before the start of the examination session - with the ribbon system of education, at the last class - with the cyclic system of education.

The score for the credit is the arithmetic mean for all components according to the traditional four-point scale and has a value that is rounded according to the method of statistics with two decimal places after the comma.

Self-employed and higher education students

Tasks for independent work:

- ***preparation for practical classes***
 - theoretical training
 - performance of test tasks
 - solving situational problems
 - practical skills training

EDUCATIONAL DISCIPLINE POLICY

Deadlines and Rescheduling Policy:

- Absences of classes for non-respectable reasons will be worked out according to the schedule of the teacher on duty.
- Absences due to valid reasons are processed according to an individual schedule with the permission of the dean's office.

Academic Integrity Policy:

Applicants must observe academic integrity, namely:

- independent performance of all types of work, tasks, forms of control provided for by the work program of this educational discipline;
 - references to sources of information in the case of using ideas, developments, statements, information;
 - observance of legislation on copyright and related rights;
 - provision of reliable information about the results of one's own educational (scientific) activities, used research methods and sources of information;
- Unacceptable in educational activities for participants of the educational process are:
- the use of family or official ties to obtain a positive or higher grade during any form of control of learning results or advantages in scientific work;
 - use of prohibited auxiliary materials or technical means (cheat sheets, notes, micro-earphones, telephones, smartphones, tablets, etc.) during control measures;
 - passing procedures for control of training results by fake persons.

For violation of academic integrity, students may be held to the following academic responsibility:

- reduction of assessment results of individual survey, use of test tasks, assessment for solving situational tasks, use of individual task, credit, etc.;
- repeated assessment (test tasks, situational tasks, individual task, assessment, etc.);
- appointment of additional control measures (additional situational tasks, individual tasks, tests, etc.);
- conducting an additional inspection of other works authored by the violator.

Attendance and Tardiness Policy:

State of health : applicants suffering from acute infectious diseases, including respiratory diseases, are not allowed to attend classes.

Lateness to classes is not acceptable. A student who is late for a class can attend it, but if the teacher has put "nb" in the journal, he must work it out in the general order.

Use of mobile devices in :

The use of any mobile devices is prohibited. In case of violation of this point, the student must leave the class and the teacher will write "nb" in the journal, which he must work out in the general order.

Mobile devices may be used by the applicant with the permission of the instructor if they are required for the completion of the assignment.

Behavior in the audience:

The behavior of applicants and teachers in the classrooms should be working and calm, strictly comply with the rules established by the Regulations on academic integrity and ethics of academic relations at Odessa National Medical University, in accordance with the Code of Academic Ethics and University Community Relations of Odessa National Medical University, Regulations on Prevention and detection of academic plagiarism in the research and educational work of students of higher education, scientists and teachers of Odessa National Medical University.