KAZAN STATE MEDICAL UNIVERSITY

OF THE MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION

Department of Epidemiology and Evidence-Based Medicine

## EPIDEMIOLOGY

Methods handbook for the 4th year international students with English medium instruction in Dentistry

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The handbook offers comprehensive theoretical and practical resources essential for students to achieve proficiency in the field of epidemiology. It comprises the course curriculum, concise lecture notes, seminar schedules, self-study assignments, essay prompts, and guidelines for effective essay writing. Each lecture section includes a sample essay authored by the instructor for reference. This training manual empowers students to independently navigate the discipline of epidemiology, enabling them to grasp fundamental concepts and engage in productive discussions.

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**DESCRIPTION OF COMPETENCIES TO BE FORMED AND BASIC REQUIREMEN**

Dear students!

You are starting to study the discipline "Epidemiology". During the course you will be able to form an idea of the most general concepts, problems and directions of epidemiology, familiarize yourself with the main stages of its formation, achievements, the paradigm of modern epidemiology. We hope that the course of epidemiology will broaden your horizons, help to form a scientific outlook, equip you with knowledge and skills necessary for the work of a doctor, as well as learn to navigate in the modern world of medical information, critically evaluate the results of research and plan their own research, to acquire skills of independent and creative thinking, which are necessary in any field of cognitive activity.

You will listen to lectures and attend practical classes. You should come to the practical sessions prepared. You will read and discuss primary sources and participate in discussions. Remember that active participation is the key to passing the exam. Good luck!

### Purpose and objectives of mastering the discipline:

*Purpose of the discipline:* mastering by students of theoretical and practical skills for the prevention of infectious, parasitic and non-infectious diseases in medical organizations, among different contingents of the population at the individual, group and population levels, as well as in emergency situations.

*Discipline Objectives:*

* formation of the ability to use descriptive, analytical and experimental epidemiological studies to identify risk factors for infectious and non-infectious diseases with assessment of the effectiveness of preventive and therapeutic measures in the framework of randomized clinical trials;
* Formation of ideas about the principles of organization of preventive work among various contingents of the population at the individual, group and population levels (primary, secondary and tertiary levels of prevention);

- mastering the methods of organization and implementation of primary preventive and anti-epidemic measures in infectious diseases among the population both at the level of primary health care, and in extreme conditions, in foci of mass destruction;

* mastering the methods of organization and implementation of measures to prevent nosocomial infections, as well as occupational diseases in medical organizations;
* mastering the skills of using normative and legal acts regulating preventive and anti-epidemic measures and sanitary and anti-epidemic regime in medical organizations;
* formation of positive behavior in the population aimed at preserving and improving the level of health.

Content of the discipline: mastering this course involves the study of sections of general epidemiology, then some sections of private epidemiology. Separate sections related to the prevention of infections associated with the provision of medical care, organization of preventive and anti-epidemic measures in emergency situations, epidemiology of non-infectious diseases. According to the curriculum, the study of the discipline "Epidemiology" is carried out in the 4th year.

The total labor intensity (volume) of the discipline is 1 credit unit (ZET), 36 academic hours and includes 3 lectures of 2 academic hours and 3 days of practical classes of 5 hours.

Classes are conducted on a cyclical basis.

In the process of mastering the program 75% of classroom hours are realized with the use of interactive educational technologies:

lecture (problematic);

discussion of homework in the form of a round table; situational tasks;

discussion (with or without brainstorming); programmed instruction and supervision.

The discipline program consists of three sections (modules). On the totality of learning outcomes after the discipline is given credit.

## DISCIPLINE STRUCTURE AND CONTENT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **№** | **Sections / topics disciplines** | **Total labor (hours)** | **Types of training sessions, including independent work of students and labor intensity (in hours)** | | | **Forms current controls grades** |
| **Auditorium training sessions** | | **Samoth. work training.** |
| **Total** | **Lectures** | **Practical. classes** |
|  | **Section 1.** | **19** | **2** | **10** | **7** | Interview, |
| **General** |  |  |  |  | case tasks, |
| **epidemiology** |  |  |  |  | testing |
| 1 | **Topic 1.1** Epidemic | 5 | 2 | - | 3 |  |
|  | process. Content |  |  |  |  |  |
|  | and organization of |  |  |  |  |  |
|  | prophylactic and |  |  |  |  |  |
|  | anti-epidemic |  |  |  |  |  |
|  | measures |  |  |  |  |  |
| 2 | **Topic 1.2.** | 7 | - | 5 | 2 |  |
|  | Disinfection, |  |  |  |  |  |
|  | sterilization, |  |  |  |  |  |
|  | disinsection, |  |  |  |  |  |
|  | deratization |  |  |  |  |  |
| 3 | **Topic 1.3**. | 7 | - | 5 | 2 |  |
|  | Immunoprophylaxis |  |  |  |  |  |
|  | **Section 2.**  **Epidemiology of infectious diseases** | **5** | **2** | **-** | **3** | Interview,  case tasks, testing |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Topic 2.1. Organization of preventive and anti- epidemic measures in acute intestinal infections,  respiratory tract infections | 5 | 2 | - | 3 |  |
|  | **Section 3. HAIS.**  **EMERGENCIES. PDI.**  **Fundamentals of military epidemiology** | **12** | **2** | **5** | **5** | Interview, case tasks, testing |
| 1 | Topic 3.1.  Epidemiology and prevention of HAIS | 5 | 2 | - | 3 |
| 2 | Topic 3.2.  Sanitary and anti- epidemic provision of the population in emergency situations, PDI. Fundamentals of  military epidemiology. | 7 | - | 5 | 2 |
|  | **TOTAL:** | **36** | **6** | **15** | **15** |  |

### Requirements to the results of mastering the discipline

The study of the discipline is aimed at the formation of the following general professional competence (GPC):

GPC 4 Able to carry out and control the effectiveness of measures on prevention, healthy lifestyle and hygiene education of the population.

GPC 4.1 Apply the basic criteria of a healthy lifestyle and methods of its formation; socio-hygienic and medical aspects of alcoholism, drug addiction, substance abuse, basic principles of their prevention; forms and methods of hygienic education among patients (their legal representatives), medical workers; basic hygienic measures of a health-improving nature, promoting health promotion and preventing the emergence of the most common diseases; basics of preventive medicine; stages of planning

Professional Competencies (PC):

PC-2: Human ability to search for necessary sources of information and data,

to perceive, analyze, remember and transfer information using digital means, as well as with the help of algorithms when working with data obtained from various sources in order to effectively use the obtained information to solve problems.

IPC 2.1. Search for necessary sources of information and data using digital tools in professional activities for various types of queries.

PC-8. Able to analyze and publicly present medical information on the basis of evidence-based medicine, to participate in scientific research, to implement new methods and techniques aimed at protecting public health.

IPC 8.1 Utilizes the basics of evidence-based medicine; the main sources of medical information based on evidence-based medicine; methods and forms of public presentation of medical information; basic principles of medical scientific research.

PC-10. Able to conduct sanitary and hygienic education among the population, training of patients and medical workers to prevent the occurrence (or) spread of dental diseases, their early diagnosis, identification of causes and conditions of their occurrence and development.

IPC 10.1 Utilizes basic hygienic measures of health-improving character, promoting health promotion and prevention of dental diseases Determines etiology, pathogenesis, prevention of dental diseases Utilizes psychological and pedagogical bases and methods of application of technical means of training, information computer technologies, electronic educational and information resources, distance educational technologies and e-learning, including telemedicine technologies

### Requirements for current control

Current control is carried out by the teacher in the course of daily academic work and is carried out within the normal organizational forms of classes.

1. ***Interview*** - a dialogue between the instructor and the student, the purpose of which is to systematize and clarify the student's knowledge, check his/her individual capabilities of mastering the material.

Response Evaluation Scale:

Assessment "excellent" (90-100 points) is given to the student, with a full answer to the question, a comprehensive assessment of the proposed situation and knowledge of theoretical material

Assessment "good" (80-89 points) is assigned to the student with minor difficulties in answering the theoretical question, with a logical justification of the answer with additional comments from the teacher.

Evaluation "satisfactory" (70-79 points) is assigned to the student with significant difficulty in answering, with uncertain and incomplete answers with the help of leading questions of the teacher.

Evaluation "unsatisfactory" (less than 70 points) is assigned to the student, with an incorrect answer to the question.

1. ***Case-task*** - a problem task in which the student is offered to comprehend a real professional-oriented situation necessary to solve the problem. The student independently formulates the goal, finds and collects information, analyzes it, puts

forward hypotheses, looks for options to solve the problem, formulates conclusions, and justifies the optimal solution to the situation.

Description of Grading Scale:

Assessment "excellent" (900-100 points) is given to the student, with a comprehensive assessment of the proposed situation and knowledge of theoretical material on the organization of preventive and anti-epidemic measures, with confident and consistent application of knowledge to solve problems.

The grade "good" (80-89 points) is assigned to the student with minor difficulties in answering theoretical questions, with the correct choice of tactics, with logical justification of answers with additional comments from the teacher.

Evaluation "satisfactory" (70-79 points) is assigned to the student, when the student has difficulty with a comprehensive assessment of the situation, with uncertain and incomplete answers with the help of leading questions from the teacher.

Evaluation "unsatisfactory" (less than 70 points) is assigned to the student, with an incorrect assessment of the situation, with the wrong organization of anti-epidemic measures, in the absence of answers or incorrect answers to leading questions of the teacher.

1. ***testing*** is a tool with the help of which a teacher assesses the degree to which a student has achieved the required knowledge, skills and abilities. Writing a test includes the creation of a verified system of questions, the actual procedure of testing and the method of measuring the results obtained. A test consists of tasks with a choice of one or more answers from 4-6 suggested answers.

Description of the evaluation scale

90-100 points - given if the resident answered 90% of the test questions correctly.

80-89 points - given if the resident answered 80% to 90% of the test questions correctly.

70-79 points - given if the resident answered 70% to 80% of the test questions correctly.

Less than 70 points - given if the resident answered less than 69% of the test questions correctly.

The final rating of mastering the discipline is estimated according to the provision of KSMU about "Score-rating system", is composed of: the average current grade for the cycle, the average score of test control for three modules, classroom rating.

Auditorium rating depends on the attendance of lectures and practical classes, on the fact and form of making up missed classes.

Practice for missed lectures is in the form of:

1. attending a lecture with another stream of students;
2. familiarization with the lecture presentation and solving tests on the lecture materials on the educational portal of KSMU.

Workouts of missed practical classes are carried out in the form of

1. attending classes with another group of students;
2. faculty interview.

Acceptance of work-offs is carried out by the faculty member on duty in accordance with the schedule approved by the head of the department.

Credit with a final rating is given to the student in the credit book and on the transcript submitted to the dean's office if the final rating exceeds 70 points.

## LECTURE ABSTRACTS AND SEMINAR PLANS, ASSIGNMENTS FOR INDEPENDENT WORK

### LECTURE 1. The paradigm of modern epidemiology

Epidemiology is the oldest medical science. Hippocrates is considered to be the founder of epidemiology. The history of epidemiology traces the struggle between two theories: miasmatic and contagionistic. Supporters of the miasmatic theory adhered to the concept that the cause of "contagious diseases" is the inhalation of miasms (harmful vapors). Proponents of the contagionist theory believed that diseases were caused by tiny particles - living organisms (Contagiumvivae). The dispute lasted for several centuries. The final victory of the contagionist theory became possible after the discovery of the microscope.

The history of the formation of epidemiology includes the pre-bacteriologic period, the bacteriologic period, and the modern period.

The course of epidemiology at Kazan Medical Institute was first organized in 1932 at the Department of Infectious Diseases. During the first 10 years of its existence, lectures were given by the Head of the Department of Infectious Diseases, Prof. V.A. Volter. The Department of Epidemiology began to function independently in 1938. The first head of the Epidemiology Department was elected candidate of medical sciences

V.I. Popov.

Modern epidemiology is a science that studies the patterns of occurrence and spread of any pathological conditions among people and develops measures of control and prevention (methods of disease control).

Objectives of epidemiology:

* + Study of the natural course of diseases
  + Study of the prevalence of the disease in the population
  + Determination of morbidity trends
  + Determining the causes of disease
  + Development of recommendations on prevention and control of the disease
  + Evaluating the effectiveness of prevention and treatment methods
  + Formulating a prediction of the spread of the disease under study Epidemiologic method (analysis) is a set of techniques designed to study the

causes and conditions of occurrence and spread of any pathological conditions, and

health conditions in the human population.

Establishing cause-and-effect relationships between human health-related phenomena at the population level is one of the main tasks of epidemiology.

Hill's criteria for causality:

* + Effect of exposure
  + The power of interconnection
  + Permanence
  + In different populations, under different circumstances.
  + Specificity
  + Consistency (in time)
  + Biological gradient
  + More exposure - more effect
  + Biological plausibility
  + Consistency
  + Availability of experimental evidence
  + Existence of analogies

Modern epidemiology includes the following sections: infectious epidemiology, non-infectious epidemiology and clinical epidemiology.

Evidence-based medicine is the conscientious, accurate and meaningful use of the best results of clinical research to choose the management of a particular patient. It is based on the idea that every decision in medicine should be based on rigorously proven scientific evidence. The term "evidence-based medicine" was first proposed in 1990 by a group of scientists from McMaster University (Toronto, Canada). The basis of EBM is the epidemiological method of obtaining and analyzing data.

Modern epidemiology is closely related to other sciences - medical and non- medical (e.g., philosophy, mathematics). Epidemiology is a diagnostic discipline of health care.

*Questions and assignments for self-monitoring:*

1. Name the object and subject of epidemiology
2. What are the goals of epidemiology?
3. What is the epidemiologic classification of infectious diseases based on?
4. Definition and content of the epidemic method
5. Name the main sections of epidemiology
6. What is the place of epidemiology in the structure of medical sciences?
7. What is the importance of epidemiology for medicine and economics?
8. Give a definition of clinical epidemiology
9. Give a definition of evidence-based medicine
10. What does hospital epidemiology study?
11. What theories of causation are you aware of?
12. Name Hill's criteria for assessing causality
13. Name the historical stages in the development of epidemiology

## PRACTICAL SESSION 1.

### Disinfection, sterilization, disinsection, deratization.

*Objective: to* master the basics of disinfectology for practical application.

*The main questions of the practical training session:*

Medical disinfection, sterilization, disinsection, deratization.

*Navigator in preparing questions:*

1. In preparation for this lesson, learn the definition of disinfection. What types of disinfection are there? What is the difference between current disinfection and final disinfection?
2. What are the mechanical, physical, biological and chemical methods of disinfection. What are the requirements for disinfectants?
3. What are the features of disinfection in respiratory tract infections, intestinal infections and particularly dangerous infections?
4. What is the principle of operation of disinfection chambers?
5. Disinfection in hospital. Quality control of disinfection.
6. How is hand sanitization performed? Describe the algorithm of hand treatment with skin antiseptics.
7. In preparation for the lesson, learn the definition of disinsection. What types of disinsection are there?
8. What are the mechanical, physical, biological and chemical methods of disinfestation. What are the requirements for disinfestation agents?
9. Quality control of disinfestation.
10. In preparation for the lesson, learn the definition of deratization. What types of deratization are there?
11. What are the mechanical, physical, biological and chemical methods of deratization. What are the requirements for deratization agents?

The first 10 minutes of the lesson are devoted to initial knowledge control (testing on the educational portal).

The next academic hour by free inquiry method discusses the questions prepared by students at home.

Sample interview questions:

1. Give a definition of the concept of disinfection.
2. Types of disinfection.
3. Selection of means and methods of disinfection.
4. Methods of quality control of disinfection.
5. Give a definition of disinfestation.
6. Classification of agents used for disinfestation.
7. Quality control of pest control measures.
8. The role of pest control measures in the prevention of natural focal infections.
9. Prevention and control of pediculosis. Define the concept of deratization.
10. Types of disinfection.
11. Types of deratization measures.
12. Quality control of deratization activities.
13. The role of deratization measures in the prevention of natural focal infections.

Further, situational tasks are solved. The main objective is to consolidate knowledge and practice skills of organization of disinfection measures.

Example of a case study:

A bacteriologically confirmed case of diphtheria was registered in the senior group of a preschool institution in a child. The sick child was hospitalized on January

30. Toxigenic strains of corynebacteria were isolated from 4 contacts (3 children and a teacher). On February 5, the bacterial carriers were hospitalized in the infectious diseases department. Final disinfection of the outbreak was carried out on January 30 and February 5. On January 30, it was carried out by the staff of the preschool, and on February 5 - by a disinfection team. In both cases disinfection was carried out with chloramine. On January 30, the surfaces were treated by wiping, on February 5 - by irrigation.

* 1. Are there any violations in different organization of final disinfection in preschool institutions?
  2. Specify to which group of chemical compounds chloramine belongs; its advantages and disadvantages.
  3. Are all objects to be decontaminated treated in the preschool facility?
  4. Is chloramine the right choice for diphtheria disinfection? Evaluate the possibility of disinfecting surfaces by different methods.
  5. Give recommendations based on the results of the disinfection evaluation.

Example of a case study:

Draw up a set of measures for fly control:

* + - on the inpatient wards;
    - in the hospital food service;
    - on the territory of the hospital (polyclinic).

Example of a case study:

Survey of fruit and vegetable warehouse, conducted by the department of preventive disinfection of the city disinfection center revealed high infestation of the territory and premises of the base by common voles. Traps on April 10th of the current year caught 3 rodents per 1000 m2 of warehouses of the base, 9% of field sites were tracked by rodents. On the open territory 42 burrows were opened by rodents again. Delivery of fruits and vegetables to the base is expected in 2 weeks.

1 Estimate the extent of infestation of the horticultural base by voles.

1. Determine the need for deratization work.
2. Determine the timing and tactics of such work.
3. Select the most rational method of rodent control.

*Literature Basic:*

1. General epidemiology with the basics of evidence-based medicine. Guide to practical training: textbook. Brazhnikov A.Yu., Briko N.I., Kiryanova E.V. et al. / Edited by V.I. Pokrovsky. 2nd edition, revised and supplemented. 2012. - 496 p.: ill.

*Additional:*

* 1. Infectious diseases and epidemiology: textbook / V. I. Pokrovsky [et al.]. - 3rd ed., revised and expanded - Moscow: GEOTAR-Media, 2012. - 1007 с.
  2. Epidemiology: textbook / N. I. Briko, V. I. Pokrovsky. - Moscow: GEOTAR- Media, 2015. - 363 с.
  3. Epidemiology of infectious diseases: textbook / N. D. Yushchuk [et al]. - 3rd ed., revision and addendum - Moscow: GEOTAR-Media, 2014. - 496 с.
  4. Epidemiology and prevention of nosocomial infections: method. development/L.M. Zorina et al.]. - Kazan; KSMU, 2013. - 92 с.
  5. Organization of work of hospital epidemiologist: teaching-methodical manual

/ N.M. Hakimov et al: In 2 parts. - Kazan; KSMU, 2013. - Ч. 1. - 108 с.

* 1. Organization of work of hospital epidemiologist: teaching-methodical manual

/ N.M. Hakimov et al: In 2 parts. - Kazan; KSMU, 2013. - Ch. 2. - 104 p.

* 1. Clinical guidelines. HIV infection and AIDS. 2006 / Federal Scientific and Methodological Center for AIDS Prevention and Control ; [developed by T. N. Ermak et al] ; ed. by V. Pokrovsky. V. Pokrovskiy. - Moscow : GEOTAR-Media, 2007. - XII, 114 p.
  2. Epidemiology and prevention of viral hepatitis : methodical development for practical training / Kazan State Medical University of the Ministry of Health of the Russian Federation. Federation, Department of Epidemiology ; [compiled by L. M. Zorina et al.]. - Kazan : KSMU, 2013. - 75 с.
  3. Modern means for deratization: methodical development for independent studies / Federal Agency for Health Care and Social Development, Kazan State Medical University, Department of Epidemiology; [compiled by: Timerzyanov M. I. et al.]. - Kazan : KSMU, 2006 -Ch. 1.-2006. - 154 с.
  4. Rotavirus infection. Epidemiology and prevention : methodical development - "Medical-Prophylactic Business" / Kazan State Medical University of the Federal Agency for Health Care and Social Development, Department of Epidemiology ; [compiled by: N. M. Hakimov et al.]. - Kazan : KSMU, 2010. - 30 с.

### Independent work

**Disinfection, sterilization, disinsection, deratization.**

1. General epidemiology with the basics of evidence-based medicine. Guide to practical training: textbook. Brazhnikov A.Yu., Briko N.I., Kiryanova E.V. et al. /

Edited by V.I. Pokrovsky. 2nd edition, revised and supplemented. 2012. - 496 p.: ill.

1. Epidemiology and prevention of nosocomial infections: method. development/L.M. Zorina et al.]. - Kazan; KSMU, 2013. - 92 с.

Students' independent work on this topic (2 hours) includes preparation for the practical lesson on the list of questions (see above - navigator for preparing questions).

## PRACTICAL SESSION 2

### Immunoprophylaxis

*Purpose: To* consolidate the basics of theoretical knowledge on immunoprophylaxis.

*The main questions of the practical training session:*

1. Types of immunity.
2. Types of Vaccines.
3. Rules of vaccination. Vaccination calendar.
4. Prevention of complications. Cold chain.
5. Federal Law "On Immunoprophylaxis of Infectious Diseases"

*Navigator in preparing questions:*

In preparation, pay attention to the stages of development of immunoprophylaxis and the role of domestic scientists (I.I. Mechnikov, L.S. Tsenkovsky, N.F. Gamaleya, A.A. Smorodintsev, P.F. Zdrodovsky, M.P. Chumakov) in the development of the doctrine of immunoprophylaxis of infectious diseases.

How are preventive vaccinations organized in hospital? National calendar of preventive vaccinations as a normative legal act regulating the timing, sequence, and scheme of vaccine administration. Regional preventive vaccination calendars.

Order of the Ministry of Health of the Russian Federation "On Approval of the National Calendar of Prophylactic Vaccinations and the Calendar of Prophylactic Vaccinations for Epidemic Indications" (with amendments and additions) can be found in the GARANT system: [http://base.garant.ru/70647158/#ixzz4UJrjirCR.](http://base.garant.ru/70647158/#ixzz4UJrjirCR)

What are the indications and contraindications for vaccination? What are active and passive immunization? How is emergency immunoprophylaxis administered?

What types of vaccines do you know?

What are the requirements for storage and transportation of immunobiological preparations ("cold chain")?

Familiarize yourself with the content of the Federal Law "On Immunoprophylaxis of Infectious Diseases", which regulates the legal basis of immunoprophylaxis ([http://www.consultant.ru/document/cons\_doc\_LAW\_20315/).](http://www.consultant.ru/document/cons_doc_LAW_20315/))

Read the highlights of the Global and Expanded Programme on Immunization [(](http://apps.who.int/immunization/programmes_systems/financing/tools/cMYP_guidelines_RU.pdf)<http://apps.who.int/immunization/programmes_systems/financing/tools/cMYP_guidel> ines\_RU.pdf).

The first 10 minutes of the lesson are devoted to initial knowledge control (testing on the educational portal).

The next academic hour by free interview method discusses the questions prepared by students at home.

Sample interview questions:

1. What is immunoprophylaxis?
2. Who was the first to use smallpox vaccinations?
3. In memory of whose merit are all preparations for creating active immunity called vaccines, and the creation of immunity by means of them called vaccination?
4. What is the difference between vaccination and variolation?
5. Which country pioneered the global eradication of smallpox?
6. In what year was the global eradication of smallpox announced?
7. Who is the creator of the domestic measles vaccine?
8. What types of insensitivity do you know?
9. Give a comparative characteristic of preparations for active and passive immunization
10. What stages of the "cold chain" do you know?
11. How temperature control of transportation and storage of MIP is carried out
12. How is the work of the vaccination room organized?
13. What vaccination record forms do you know?
14. What is an MIP brackerage?
15. What are the rules for the destruction of unusable MIP?
16. What is the essence of active-passive tetanus prophylaxis?
17. Drugs to protect against diphtheria?
18. Drugs to protect against tuberculosis?
19. Polio protection drugs?
20. Rabies drugs?
21. What are the intervals between the administration of blood and blood products and MIP?
22. What routes of administration of MIP are used?
23. What is tour immunization against polio?
24. Why do women of childbearing age need to know their immunity status against rubella?

Then situational tasks are solved. The main objective is to consolidate knowledge on the topic, to develop skills to organize and conduct immunoprophylaxis.

Example of a case study:

The refrigerator in the vaccination room broke down and the vaccines have been at room temperature for three days. Can they be used?

*Literature Basic:*

1. General epidemiology with the basics of evidence-based medicine. Guide to practical training: textbook. Brazhnikov A.Y., Briko N.I., Kiryanova E.V. et al. / Edited by V.I. Pokrovsky. 2nd edition, revised and supplemented. 2012. - 496 p.: ill.

*Additional:*

* 1. Infectious diseases and epidemiology: textbook / V. I. Pokrovsky [et al.]. - 3rd ed., revised and expanded. - M.: GEOTAR-Media, 2012. - 1007 с.
  2. Epidemiology: textbook / N. I. Briko, V. I. Pokrovsky. - Moscow: GEOTAR-Media, 2015. - 363 с.
  3. Epidemiology of infectious diseases: textbook / N. D. Yushchuk [et al]. - 3rd ed., revision and addendum - Moscow: GEOTAR-Media, 2014. - 496 с.
  4. Fundamentals of immunoprophylaxis : textbook / Kazan State Medical University of the Ministry of Health of the Russian Federation, Department of Epidemiology. Federation, Department of Epidemiology ; [compiled by: I. G. Zakirov et al.]. - Kazan : KSMU, 2012. - 114 с.
  5. Epidemiology and prevention of viral hepatitis : methodical development for practical training / Kazan State Medical University of the Ministry of Health of the Russian Federation. Federation, Department of Epidemiology ; [compiled by L. M. Zorina et al.]. - Kazan : KSMU, 2013. - 75 с.
  6. Vaccine prophylaxis and HIV infection : a methodical manual / Kazan State Medical University of the Federal Agency for Health Care and Social Development, Department of Epidemiology ; [compiled by: A. G. Sharipova, I. G. Zakirov]. - Kazan : KSMU, 2010. - 37 с.

### Independent work Immunoprophylaxis of infectious diseases.

1. General epidemiology with the basics of evidence-based medicine. Guide to practical training: textbook. Brazhnikov A.Y., Briko N.I., Kiryanova E.V. et al. / Edited by V.I. Pokrovsky. 2nd edition, revised and supplemented. 2012. - 496 p.: ill.
2. Fundamentals of immunoprophylaxis : textbook / Kazan State Medical University of the Ministry of Health of the Russian Federation, Department of Epidemiology. Federation, Department of Epidemiology ; [compiled by: I. G. Zakirov et al.]. - Kazan: KSMU, 2012. - 114 с.

Students' independent work on this topic (2 hours) includes preparation for the practical lesson on the list of questions (see above - navigator for preparing questions);

### LECTURE 2. Organization of prophylactic and anti-epidemic measures in infectious diseases

Intestinal infections include infections with predominant localization of the causative agent in the gastrointestinal tract and, accordingly, fecal-oral transmission mechanism. The source of infection may be a sick person (carrier), animal or environmental objects.

Intestinal anthroponoses:

* viral (HAV, HEV, EVI, Polio)
* microbial (typhus and paratyphus, cholera, shigellosis, Escherichiosis, etc.).
* protozoal (Amoebiasis, giardiasis)
* mycotic (Histoplasmosis)
* helminthoses (ascarido, hymenolepido, trichocephalosis, enterobiasis) Relevance of intestinal infections, their prevalence.

Intestinal zoonoses:

* viral (Lassa fever, foot-and-mouth disease)
* microbial (botulism, brucellosis, yersinia, leptospirosis, salmonellosis, etc.).
* protozoal (toxoplasmosis, cryptosporidiosis)
* helminthic diseases (alveococcosis, diphilobothriosis, opistorchosis, toxocarosis, trichinellosis, echinococcosis, etc.).

Intestinal sapronoses:

* microbial (Klebsiellosis, aeromonosis, clostridium food poisoning)
* protozoal (meningoencephalitisantamoebic primary)

Despite improvements in hygiene and sanitation, the role of intestinal infections in the morbidity of the population is still significant. In recent years in our country there has been a change in the etiologic structure of morbidity with an increasing role of viral diseases in the etiologic structure of AII.

Immunity and susceptibility to intestinal infections depend on the type of pathogen and the state of the individual's immune system. Most intestinal infections are characterized by high susceptibility and the formation of persistent immunity.

The predominant routes of infection are aquatic, foodborne and household contact. The routes of transmission depend on the ecological and biological properties of the pathogen and the way it enters water or food products. For example, Shigella zonne is characterized by foodborne transmission, while Flexnera is more often transmitted by water or household contact. The relevance of different routes of transmission in intestinal anthroponoses may be different in different social and domestic population groups.

Water outbreaks, as a rule, arise as a result of unsatisfactory sanitary and technical condition of water supply and sewage facilities. They are characterized by mass affection of the population, territorial spread of morbidity in accordance with the scheme of water supply, polyetiology.

In the foodborne route, dairy products, salads, cakes, milk, meat, eggs, vegetables and fruit are the most common transmission factors. Signs of foodborne transmission: common source (canteen, store, etc.) and food for the predominant number of cases; increase in the number of cases in a very short time between the minimum and maximum incubation period, with predominance of cases in the period close to the minimum incubation period (due to the massiveness of microbial contamination of food); rapid cessation of cases after withdrawal of the infected product; rare cases of secondary infections; monoethiologic; predominance of severe cases of foodborne illnesses; and the predominance of foodborne illnesses.

The following social factors may influence the incidence of intestinal infections:

-centralization of water supply and nutrition

-land improvement (centralization of foul sewage disposal, cleaning)

-increasing the general culture of the population

-improvement of microbiological quality of water and food products

-possible accidents in the water supply network and centralized microbial contamination of food

-increased pollution of open water bodies and impediment of its self-purification processes

-contamination of intestinal infection by household factors more often in communal dwellings with the area per 1 person less than 4.5 m2; single persons in separate apartments are not involved in the epidemic process; among single persons there is rarely a household route of transmission, mainly - food.

-urbanization leads to increased frequency of outbreaks (storage of raw vegetables and root crops in large vegetable stores, contact with rodents, humidity, lack of sunlight).

Intestinal infections are characterized by a variety of clinical forms, which can cause difficulties in their diagnosis.

Control of sanitary and hygienic measures is of the greatest importance for the prevention of AII. Vaccines may be used to protect against some infections (poliomyelitis, typhoid, cholera, viral hepatitis A).

*Questions and assignments for self-monitoring:*

1. List diseases from the group of intestinal anthroponoses (zoonoses).
2. What are the main routes of transmission of intestinal infections and their characteristics?
3. List the major groups of interventions to prevent intestinal infections.
4. What is the pattern of epidemiologic surveillance of an outbreak of intestinal anthroponoses?

Respiratory tract infections are the most common in the population due to high contagiousness, diversity of pathogens, often the formation of only unstable, type- specific immunity.

They are accompanied by high morbidity, especially among the child population (mainly in organized children's groups). Some of them (diphtheria, meningococcal infection) are characterized by high lethality. It is impossible to overestimate the economic damage caused by respiratory infections, which are the main cause of temporary disability of the working population in our country.

Due to the high variability of the pathogen and a decreasing immune layer, influenza pandemics occur every 10-40 years.

Examples of influenza pandemics: In 1918-1919 Spanish influenza H1N1 killed 40-50 million people. In 1957-1958 Asian influenza H2N2 2 million, in 1968-1969 H3N2 Hong Kong influenza victimized 1 million people.

The etiologic structure of respiratory infections includes bacteria, viruses, fungi, and protozoa.

Most respiratory tract infections are characterized by high contagiousness. At the same time, some of them can be attributed to opportunistic (pneumocystis pneumonia, atypical mycobacteriosis), i.e. realized only against the background of immunocompromised state of the organism.

The mechanism of transmission is aerosolized. Pathways - airborne droplet, airborne dust, household contact. Household items (towels, toys, books, utensils) can serve as transmission factors, as in diphtheria and scarlet fever.

Prevention of respiratory tract infections includes nonspecific and specific measures.

Non-specific prophylaxis includes sanitary-hygienic and general health measures. During the rise in respiratory infections, a certain preventive role is played by timely isolation of the sick, compliance with mask regime, frequent hand washing, regular ventilation of the room, wet cleaning.

Nevertheless, vaccine prophylaxis plays the most effective role in preventing this group of diseases. The implementation of a mass vaccination program against measles, diphtheria, whooping cough, epidemic mumps and tuberculosis has significantly reduced the incidence of these infections. At the same time, in recent years there has been a slight increase in the incidence of whooping cough, which is due to low vaccination coverage and a large number of unjustified refusals to be immunized. The inclusion of rubella vaccination in the national immunization calendar has virtually eliminated the incidence of congenital rubella syndrome.

In addition, emergency prophylaxis at the beginning of an outbreak is possible, using antiviral chemoprevention (e.g., oseltamivir for influenza), antibacterial drugs (rifampin and other antibiotics for meningococcal infections), bacteriophages, interferons, vaccines, and immunoglobulins.

Control of morbidity, analysis of the immune layer of the population, control of immunoprophylaxis, and microbiological monitoring are important in epidemiologic surveillance.

*Questions and assignments for self-monitoring:*

1. Name the most relevant respiratory tract infectious agents for our region.
2. What is the mechanism of transmission and which routes of transmission are realized in this group of infections?
3. What is the role of vaccine prophylaxis in controlling the incidence of respiratory infections?

### LECTURE 3: Epidemiology and Prevention of HAIS

Intrahospital infection (synonyms - iatrogenic, nosocomial) is an infection that occurs in health care facilities.

Intrahospital infection is any clinically recognizable disease of microbial etiology that affects a patient as a result of seeking medical care or a health care worker as a result of working in a health care facility, regardless of whether symptoms of the disease occur during or after a hospital stay.

The term HAIS is more accurate and is currently used both in scientific literature and in WHO publications and regulatory documents of most countries of the world. The general criterion for attributing cases of infections to HAIS is a direct link

between their occurrence and the provision of medical care (treatment, diagnostic tests, immunization, etc.).

HAIS includes cases of infection not only associated with the underlying disease in hospitalized patients, but also associated with the provision of any type of medical care (in outpatient clinics, educational, sanatorium and recreational institutions, social protection institutions, during the provision of emergency medical care at home, etc.), as well as cases of infection of medical workers as a result of their professional activities.

The level of morbidity of HAIS is an important socio-economic characteristic of the development of modern society and largely reflects the quality of medical care provided to the population. It is an important component of economic damage in practical public health care.

Every year, since the introduction in Russia of official accounting and registration of STIs in 1990, the incidence rate has been (1.5-1.9 per 1000). According to official statistics, about 25-30 thousand cases of HAIS are registered among patients of LRCs in the Russian Federation, but their real number is not less than 2-2.5 million cases. According to the data of domestic and foreign researchers, HAIS develop in 5- 20% of hospitalized patients.

In addition to the underlying disease, HAIS prolongs the duration of hospitalization by an average of 10 bed-days.

According to WHO data, the mortality rate among those hospitalized with HAIS is 10 times higher than in persons without infection.

Historically, several periods can be distinguished in relation to the problem of

HAIS:

* 1. The pre-bacteriologic period. It is characterized by enormous

mortality from "unclean wounds". Thus, in 1646 in the Paris hospital, one of the oldest obstetric institutions, 66% of women in labor died of labor fever. In 1800, about 60% of all patients who underwent amputation died of gas gangrene.

* 1. The period of antisepsis and asepsis. It began with the works of L. Pasteur (1861), on the basis of which Lister (1865) began to implement his method, which was called "antisepsis". In addition to asepsis, it opened wide opportunities for the development of all sections of surgery.
  2. The period of widespread use of antibiotics and chemotherapeutic antimicrobial agents. With the introduction of chemotherapeutic drugs and especially antibiotics into medical practice, so great strides were made in the control of hospital infection that physicians began to neglect the tried-and-true methods of asepsis and antisepsis, relying on the tremendous capabilities of antibiotics.
  3. Modern period. Already in the late 1940s of the twentieth century, there were reports of pathogens of hospital infections that have acquired resistance to antibiotics and chemotherapeutic drugs. The spread of such pathogens against the background of various defects of sanitary and hygienic regime significantly complicates the fight against hospital-acquired infections and, despite certain successes, the incidence rates in the country remain high. The frequency of postoperative purulent complications currently ranges widely: from 3% to 20-35%. Most often these complications are registered in intensive care, surgical and traumatologic (orthopedic)

departments. The highest level of HAIS morbidity is noted in large hospitals (more than 500 beds), on the basis of which students were trained.

Hospital-acquired infections nullify complex operations on vital organs and undermine the efforts of many people.

The growth of HAIS in modern conditions is caused by a complex of factors, the main of which are the following:

1. Creating large hospital complexes with a distinctive ecology that is defined

by:

large number of patients (mostly weakened),

a large number of medical personnel in constant and close contact with patients, intensive migration processes,

environmental lock-in

circulation of a number of strains of opportunistic microorganisms

1. Formation of a powerful artificial (artificial) mechanism of transmission of infectious agents associated with invasive interventions.
2. Activation of natural mechanisms of transmission of pathogens of infectious diseases, especially airborne and contact and domestic routes in conditions of close communication between patients and medical personnel in medical institutions.
3. The presence of a constant large array of sources of infections in the form of patients coming to the hospital with unrecognized infectious diseases, medical personnel (carriers, patients with sterile forms of infections), persons who have HAIS in addition to the main disease in the hospital.
4. Increase in the number of patients surviving due to modern medical advances.
5. Increase in the proportion of people with IDD
6. Use of techniques that require special sterilization methods.

The etiologic structure of UTIs is represented by 3 groups of microbes: pathogenic bacteria, viruses, fungi, protozoa, conditionally pathogenic bacteria, opportunistic microbes causing the infectious process against the background of immunodeficiency of the macroorganism.The importance of individual pathogens in the etiology of hospital infection has been constantly changing.In the pre-antibiotic period, beta-hemolytic streptococcus serogroup A occupied the leading position. Then its place was taken by pathogenic staphylococcus. In recent years, staphylococcus has given way to Gram-negative bacillary microflora: Ps. aeruginosa, Proteus, Klebsiella, Enterobacter, Serratia, Escherichia and others.

Hospital strain is a conditionally pathogenic microorganism adapted to the conditions of a given medical organization, adaptation of which to the conditions of the hospital goes in two directions: virulence enhancement due to passage through the organism of hospital patients; formation of resistance to antibiotics, antiseptics, chemopreparations, disinfectants used in a given medical organization.

HAIS can be of endogenous and exogenous origin.

The bulk of HAIS are associated with infection from humans in hospital settings (exogenous infection).

Autoinfection (endogenous infection) is less common. The proportion of endogenous infections is negligible.

Prevention of HAIS requires a comprehensive approach, development and implementation of a wide range of organizational, hygienic, disinfection and sterilization, anti-epidemic measures.

*Questions and assignments for self-monitoring:*

1. Give a definition of intrahospital infection and HAIS.
2. Group the main reasons for the growth of HAIS in modern conditions.
3. What is the etiologic structure of HAIS at the present stage?
4. What are the main directions of prevention of HAIS?

## PRACTICAL SESSION 3.

### Infectious and parasitic diseases that require measures for sanitary protection of the territory of the Russian Federation (PDI). Fundamentals of military epidemiology. Epidemiology of emergency situations.

*Purpose: To* consolidate the basics of theoretical knowledge on the issues of sanitary protection of the territory of the Russian Federation. EMERGENCIES. Basics of military epidemiology.

*The main questions of the practical training session*:

1. The concept of sanitary protection of the territory of the Russian Federation.
2. The main documents regulating measures on sanitary protection of the country's territory.
3. The basic principles of organization of anti-epidemic measures in the occurrence of cases of PDI.
4. What is meant by an emergency situation?
5. Name the groups of emergencies.
6. What factors activate the epidemic process in the emergency zone?
7. What groups of medical response activities are conducted in disaster areas

*Navigator in preparing questions:*

In preparation for the class, familiarize yourself with the Sanitary and Epidemiological Regulations.

Answer the questions:

What difficulties in sanitary protection of the territories of states have to be faced at the present stage?

What documents regulate international norms of sanitary law? How are sanitary measures to protect Russia's borders organized?

In the workbook, describe the algorithm of measures taken in the detection of PDI, using cholera and plague as examples.

What can be done to prevent the importation of Ebola and Marburg fever into

Russia?

The first 10 minutes of the lesson are devoted to initial knowledge control (testing on the educational portal).

The next academic hour by free inquiry method discusses the questions prepared by students at home.

*Sample discussion questions:*

* 1. What is meant by "sanitary protection of the territory of the country"?
  2. What measures are taken when an infectious disease patient is detected on a seagoing vessel?
  3. How are anti-epidemic measures implemented upon arrival of a ship in port?
  4. What measures are taken when an infectious disease patient is detected on an aircraft, land vehicle?
  5. What interventions are made for sick, contact persons?
  6. Who organizes and conducts these events?
  7. Name the main document regulating sanitary protection of Russia's borders.
  8. What diseases require sanitary protection measures for the territory of the Russian Federation"?
  9. What groups of interventions are carried out when a cholera patient is identified in a community?
  10. What groups of measures are taken when a plague patient is detected in a community?
  11. What groups of interventions are carried out when a polio patient is identified in a community?
  12. Which groups of interventions are carried out when a malaria patient is identified in a community?
  13. What factors contribute to the development of an epidemic among troops?
  14. What are the purpose and objectives of the anti-epidemic defense of troops?
  15. How are sanitary and epidemiologic measures carried out in favorable, unstable, unfavorable, emergency sanitary and epidemiologic condition?
  16. What is sanitary and epidemiologic reconnaissance?

Then case problems are solved. The main objective is to consolidate knowledge on the topic, to develop skills to organize and carry out activities on sanitary protection of the country's territory.

*Example of a case study:*

In 1967, an acute infectious disease characterized by bloody vomiting and nosebleeds occurred among employees of research centers in Germany and Yugoslavia. All those who became ill died. Later, in 7-14 days, cases of hemorrhages were registered among the workers of hospitals where the victims received medical care. From the collected epidemiological anamnesis, it became known that all employees of research centers had contacts with green monkeys brought from Uganda.

Questions:

* + 1. What is the disease described in case? Which group does the causative agent belong to?
    2. What are the current methods of its laboratory diagnosis?
    3. In connection with the possibility of importation of this infection into Russia, define a set of preventive measures.
    4. Identify a set of anti-epidemic measures to be taken in the event of an outbreak of this exotic disease.

*Literature Basic:*

1. Epidemiology with the basics of evidence-based medicine. Guide to practical training: textbook. Brazhnikov A.Y., Briko N.I., Kiryanova E.V. et al. / Edited by V.I. Pokrovsky. 2nd edition, revised and supplemented. 2012. - 496 p.: ill.

*Additional:*

1. Infectious diseases and epidemiology: textbook / V. I. Pokrovsky [et al.]. - 3rd edition, revised and supplemented. - Moscow: GEOTAR-Media, 2012. - 1007 с.
2. Epidemiology: textbook / N. I. Briko, V. I. Pokrovsky. - Moscow: GEOTAR- Media, 2015. - 363 с.
3. Epidemiology of infectious diseases: textbook / N. D. Yushchuk [et al.]. - 3rd ed., revision and addendum - Moscow: GEOTAR-Media, 2014. - 496 с
4. Fundamentals of immunoprophylaxis : textbook / Kazan State Medical University of the Ministry of Health of the Russian Federation, Department of Epidemiology. Federation, Department of Epidemiology ; [compiled by: I. G. Zakirov et al.]. - Kazan : KSMU, 2012. - 114 с.

**Independent work**

**Infectious and parasitic diseases requiring sanitary protection of the territory of the Russian Federation (SPR). Fundamentals of military epidemiology.**

**Epidemiology of emergency situations.**

1. General epidemiology with the basics of evidence-based medicine. Guide to practical training: textbook. Brazhnikov A.Yu., Briko N.I., Kiryanova E.V. et al. / Edited by V.I. Pokrovsky. 2nd edition, revised and supplemented. 2012. - 496 p.: ill.

Students' independent work on this topic (2 hours) includes preparation for the practical lesson on the list of questions (see above - navigator for preparing questions).