Al-Farabi Kazakh National University

Faculty Medicine and Health Care

Education program on specialty:

“6B 10105 Public Health”

PROGRAM OF THE FINAL EXAM IN THE DISCIPLINE OF COURSE “GENERAL EPIDEMIOLOGY”

6 credits

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TMC OF COURSE IS CONFIRMED

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PROGRAM
OF THE FINAL EXAM ON COURSE "GENERAL EPIDEMIOLOGY" 6 credits

Study topics for the exam: The final exam will be in writing form as a Case Study. The thematic content covers all types of work: topics from lectures and seminars, as well as assignments for master's students' independent work.

The outcome of learning:

1. To demonstrate knowledge and understanding of the principles of Epidemiology as a science in Public Health.
2. To distinguish concepts of causality in epidemiology.
3. Demonstrate skills to estimate Population Health.
4. To demonstrate knowledge and skills in understanding the hierarchy and design of epidemiologic studies.
5. To show the ability to plan and provide an investigation of Infectious Diseases

List of examination items for preparation to the exam

Module I. Bases and Concepts of Epidemiology
Class 1. Introduction to Epidemiology. Definition of Epidemiology. History of Epidemiological methods and concepts. Core Epidemiologic Functions. Causal thinking. Core The Epidemiologic Approach.
Content. Epidemiology is the study of the frequency and determinants of diseases that are distributed in a specific population group. In recent years, epidemiology has become an increasingly important approach in both public health and clinical practice. Epidemiology is the basic science of disease prevention and plays a major role in the development and evaluation of public policy and social and legal arenas.
Epidemiology studies using epidemiologic studies in Medicine. So Epidemiology and Clinical Epidemiology have close relationship for solving problem of People's health. Quantitative and Qualified Epidemiology.
Class. 2. Concepts of Disease Occurrence. Natural History and Spectrum of Disease. Chain of Infection. Epidemic Disease Occurrence.
Content. A critical premise of epidemiology is that disease and other health events do not occur randomly in a population. Some models of disease causation have been proposed. The traditional model for infectious disease consists of an external **agent**, a susceptible **host**, and an **environment** that brings the host and agent together. In this model, disease results from the interaction between the agent and the susceptible host in an environment that supports the transmission of the agent from a source to that host.
Class 3. Quantitative and Qualified Epidemiology. Measures of risk. Frequency Measures. Morbidity and Mortality Frequency Measures. Natality (Birth) Measures. Measures of Association. Measures of Public Health Impact.
Content. Quantitative and qualitative research use different research methods to collect and analyze data, and they allow you to answer different kinds of research questions. For quantitative data, statistical analysis methods were used to test relationships between variables, and for qualitative data, it used methods such as thematic analysis to interpret patterns and meanings in the data. Qualitative vs. quantitative research. A descriptive research design use a wide variety of quantitative and qualitative methods to investigate one or more variables. The researcher observes and measures variables related to disease and their outcomes of.
Class 4. Epidemiological Investigation. Investigating an Outbreak.

Content. Outbreaks of disease is the occurrence of more cases than expected or occur frequently. Each day, health departments learn about cases or outbreaks that require investigation. One way is to analyze surveillance data is reports of cases of communicable diseases that laboratories and healthcare providers routinely send to health departments. Investigation indicated that the increase in gastroenteritis was

This is probably attributable to the consumption of spoiled meat during the power failure. The steps of outbreak investigations are Prepare for field work, Establish the existence of an outbreak, Verify the diagnosis, Construct a working case definition, Find cases systematically and record information, Perform descriptive epidemiology, Develop hypotheses, Evaluate hypotheses epidemiologically, As necessary, reconsider, refine, and re-evaluate hypotheses, Compare and reconcile with laboratory and/or environmental studies, Implement control and prevention measures, Initiate or maintain surveillance, Communicate findings.

Class 5. Public Health Surveillance.

Content. The health department is responsible for protecting the public's health using a program called Public Health Surveillance, which has the function of surveying and controlling population health. The objectives of PHS are Identifying Health Problems for Surveillance, Collecting Data for Surveillance, Analyzing and Interpreting Data, Disseminating Data and Interpretations, Evaluating and Improving Surveillance, Summary, and

Module II. Methodological Approaches in Epidemiology

Class 6. Concepts and Design of Epidemiological Studies. Descriptive studies: case reports, case series, ecological and cross-sectional.

Content. Epidemiologic studies are divided into observational and interventional. Observational studies can be descriptive and analytical. Descriptive studies identify patterns among cases and in populations by time, place and person. From these observations, epidemiologists develop hypotheses about the causes of these patterns and about the factors that increase the risk of disease. Descriptive research answers what, when, where, when, and how questions, but not why and how questions. Hypotheses are formed based on descriptive studies. In other words, epidemiologists can use descriptive epidemiology to generate hypotheses.

Class 7. Design of Epidemiological Studies. Descriptive studies. Descriptive studies: case reports, case series, ecological and cross-sectional.: strength and limitations.

Content. Descriptive studies: ecological and cross-sectional studies. Estimation of advantages and disadvantages. Using in Medicine. Measurement of associations.An ecological study design is used to monitor population health, make large-scale comparisons, study the relationship between population-level exposure to risk factors and disease, or to look at the contextual effect of risk factors on the population. In a cross-sectional study, the investigator measures the outcome and the exposures in the study participants at the same time on the inclusion and exclusion criteria set for the study. The investigator follows the study to assess the exposure and the outcomes.

Class 8. Analytic studies are then undertaken to test specific hypotheses. Subject samples are identified, and information about exposure status and outcome is collected.

The essence of an analytic study is that groups of subjects are compared to estimate the magnitude of the association between exposures and outcomes. This is a case-control study.

Class 7. Analytical studies. Cohort study: strength and limitations, measure association, using in Medicine. Practical work: analysis of case-control study using scientific articles from websites as an example. Evaluation and measurement of the occurrence of diseases. Exposure measurement in studies: RR, OR, AR, AR%, PAR, PAR%. Practical work using scientific articles from websites as an example.

Content. Analytic studies are then undertaken to test specific hypotheses. Samples of subjects are identified, and information about exposure status and outcome is collected. The essence of an analytic study is that groups of subjects are compared to estimate the magnitude of association between exposures and outcomes. This is a cohort study.

Class 8. Analytical studies. Case-control study: strength and limitations, using in Medicine. Measures of association or measures of excess risk. OR, RR, AR, AR%, PAR, PAR%. Content.

The cohort study is the main analytical study focusing on the exposition of risk factors. They were open and closed, retrospective and prospective. Evaluation and measurement of the occurrence of diseases. Exposure measurement in studies using RR, OR, AR, AR%, PAR, PAR%. Practical work using scientific articles from websites as an example. Summary measures of population health are measures that combine information on mortality and non-fatal health outcomes to represent the health of a particular population as a single number. A wide array of summary measures have been proposed (for example, active life expectancy, disability-free life expectancy, dementia-free life expectancy, disability-adjusted life expectancy, health-adjusted life expectancy, healthy life-years, Years of Healthy Life, disability-adjusted life years, etc.). Based on a simple survivorship curve, these measures can be divided broadly into two families: health expectancies and health gaps.
Class 9. Experimental studies. Randomized controlled trial and non-randomized trial. Stratified, crossover, factorial design, and group randomization. Design of clinical trials (phases, safety, and effectiveness of drugs).
Content. Experimental studies are studies in which the investigator artificially manipulates study factors or subjects, such as a therapeutic regimen or some other parameter. An experimental study is the preferred means of hypothesis testing in most laboratory settings, and relevant methods are subject to continuing improvements. Types of experimental studies are randomized and non-randomized trials.
Class 10. Bias and confounding factors in studies. Overview of epidemiological studies. Practical work using scientific articles from websites as an example.
Content. Bias may be defined as any systematic error in an epidemiological study that results in an incorrect estimate of the true effect of an exposure on the outcome of interest. Bias results from systematic errors in the research methodology. More than 50 types of bias have been identified in epidemiological studies, but for simplicity, they can be broadly grouped into two categories: information bias and selection bias. Confounding provides an alternative explanation for an association between an exposure (X) and an outcome. It occurs when an observed association is, in fact, distorted because the exposure is also correlated with another risk factor (Y). This risk factor Y is also associated with the outcome but independently of the exposure under investigation, X. As a consequence, the estimated association is not the same as the true effect of exposure X on the outcome.

Module III. Module III. Types of Epidemiology Class 11. Diagnostic and screening tests. Sensitivity and specificity of tests.
Content. A diagnostic test is used to determine the presence or absence of a disease when a subject shows signs or symptoms of the disease. A screening test identifies asymptomatic individuals who may have the disease. The diagnostic test is performed after a positive screening test to establish a definitive diagnosis.The probability of having the disease, given the test results, is called the predictive value of the test. Positive predictive value is the probability that a patient with a positive (abnormal) test result actually has the disease. Negative predictive value is the probability that a person with a negative (normal) test result is truly free of disease.
Sensitivity is the ability of the test to identify correctly those who have the disease. Specificity is the ability of the test to identify correctly those who do not have the disease. Class 12. Statistical methods in Epidemiology. Meta-Analysis. Practical work using scientific articles from websites as an example.
Content. Statistical methods and techniques used in Epidemiology. The study design and data type determines epidemiologic studies. Principles of Data Analysis, Statistical Thinking, Multivariate Analysis, Handling of Data Problems, Meta-Analysis. Class 13. DEPTH model in Medicine. Implementation of epidemiologic studies in Medicine: Practical work using scientific articles from websites as an example. Content: DEPTH model in Medicine. Diagnostic, etiologic, prognostic, and therapeutic research are used to solve Clinical Medicine problems.
Class 14. Exposure-Oriented Epidemiology: Occupational, Environmental, Nutritional, Radiation, Physical Activity Epidemiology.

Content. Epidemiology has been defined as the study of the effects of workplace exposures on the frequency and distribution of diseases and injuries in the population. Thus, it is an exposure-oriented discipline versus outcome–oriented Epidemiology, such as Epidemiology of Infectious diseases, cardiovascular diseases, etc. Types of Exposure-Oriented Epidemiology are Occupational, Environmental, Nutritional, Radiation, and Physical Activity Epidemiology. Class 15. Outcome-Oriented Epidemiology: Infectious Disease Epidemiology, Cardiovascular Disease and Health, Cancer Epidemiology, Epidemiology of Diabetes, Epidemiology of Psychiatric Disorders.Content. Outcome-oriented epidemiology, such as Infectious Disease Epidemiology, Cardiovascular Disease And Health, Cancer Epidemiology, Epidemiology of Diabetes, and The epidemiology of Psychiatric Disorders, is based on the results of outcomes related to exposure determinants (reasons and risk factors). They are the major causes of burden: morbidity, mortality, and disorders.

EXAM RULES

1. Bachelor students are authorized in the Moodle LMS and get access to the task "Final exam in the discipline" at the time set by the teacher.
2. Learn the topics of the instructor's essay. case-study
3. Perform the task within 3 hours

4. Load the completed work on the case study into the LMS Moodle for this:
4.1 Students should be authorized in LMS Moodle,
4.2 open the element "Final exam in the discipline",
4.3 select the item "Add an answer to the task",
4.4 upload their works in the file upload field,
4.5 click "Save".

The form of the final control (exam):

WRITTEN- CASE STUDY

Form of conducting final control (exam) *.	**Used platform**	**For whom recommend**	**Availability of proctoring, video recording, verification for plagiarism**	**Possibility generating tickets of questions**	**How is done verification of works**
WRITTEN: – case study	LMS MOODLE	bachelors	Video recording at individual work - not required. Mandatory check for plagiarism in the works of doctoral students. Provided automatic check work for availability plagiarism with using two services: Antiplagiarism (required) and Strike Plagiarism (if necessary).	**no**	1. Teacher discipline gets ready files / responses in DLS Moodle. 2. Evaluates the work, checks on the presence of plagiarism. 3. Puts points in DLS MOODLE. 4. Transfer points to

Grading

Final assessment of the two stages of the exam: report assessment	Numerical assessment	Scores (%)	Traditional assessment	Requirements
A A-	4,0 3,67	95-100 90-94	Excellent	Full understanding of course topics. Use of cognitive, systemic, and functional competencies. Critical thinking, analysis, and application of knowledge and skills.
B+ B B- C+	3,33 3,0 2,67 2,33	85-89 80-84 75-79 70-74	Good	Understanding of course topics with few inaccuracies. Using cognitive, systemic, and functional competencies, as well as standard critical thinking, analysis, and application of knowledge and skills.
C C-	2,0 1,67	65-69 60-64	Satisfied	Incomplete understanding of course topics. Students do not use cognitive, systemic, and functional competencies to the full extent. Standard critical thinking, poor analysis, and incomplete application of knowledge and skills.
D+ D- FX	1,33 1,0 0,5	55-59 50-54 25-49	Unsatisfied	There is a lack of understanding of course topics. The student does not use cognitive, systemic, and functional competencies. There is no critical thinking, and there is poor analysis and application of knowledge and skills.

Required and Recommended Reading :

1. Aschengrau A., Essentials of Epidemiology in Public Health, 3rd Edition, 2008 **Recommended reading**:
1. Gordis: Epidemiology, 5th Edition, Saunders 2013
2. Rothman K., Modern Epidemiology, 3rd Edition, 2008
3. Pickles A. Epidemiological Methods in Life Course Research, 1st Edition, 2007
4. Webb P and Bain C. Essential Epidemiology: An introduction for Students and Health Professionals. Second Edition. Cambridge University Press. 2011.Учебно-методический комплекс дисциплины «Вакциноуправляемыеинфекции. Иммунопрофилактика» Составитель:и.о. доцента Искакова Ф.А.., 2019-2020 уч. г.
5. Wolfgang, A. Handbook of Epidemiology. Vol.1//Ahrens Wolfgang, Peugeot Iris. - 2 ed.- Springer Reference, 2014.- 469 p.
6. Principles and methods of Epidemiology. 3-d Edition. R. Dicker Ooffice of epidemiologic program СДС, USAID. -2012.-457 P.
7. Principles of Epidemiology in Public Health Practice. Third Edition. An introduction to Epidemiology and Biostatics.US, CDC, Atlanta. -2012.-6-75 p.
8. Hennekens, C., & Buring, J. (1987). Epidemiology in Medicine, Boston/Toronto: Little, Brown and Company.
9. Kelsey, J., Whittemore, A., Evans, A. & Thompson, D. (1996). Methods in Observational Epidemiology, Second Edition, New York: Oxford University Press.

Electronic source:

10. www.who.org
11. www.cdc.gov
12. www.medline
13. www.cockraine.library
14. www.PubMed

Written Exam to discipline "General Epidemiology"
for the second-year students of Public Health specialty, English Group

Clinical scenario 1.

In December 2023, an outbreak of acute intestinal infection occurred among tenth-grade students who had participated in a city-wide field trip. Half of the students traveled from December 2 to December 7 (Tour A); the other half traveled from December 3 to December 8 (Tour B). The itineraries were similar. Although teachers and other adult chaperones accompanied the students on both tours, no adult reported illness. In addition, no illness was reported among students who did not go on the field trip, and no cases of E. coli O157 were reported in the community that week. A line listing of 26 persons with symptoms of abdominal pain and/or diarrhea is presented below. Using the information in the line listing, develop a case definition that you might use for the outbreak investigation. [Note that persons infected with E. coli O157 typically experience severe abdominal cramps, bloody diarrhea, and low-grade fever after a 1– to 8–day incubation period (usually 2–4 days).]

Table 6.4 Line Listing of 26 Persons with Symptoms — School District A, December 2023

Patient #	Grade & School	Age	Sex	Tour	Onset Date	Severe Abdominal Pain?	No. Times Diarrhea	Stool Testing
1	10 — 1	17	M	A	Dec. 8	Y	3	Not done
2	10 — 1	16	F	A	Dec. 6	N	1	Negative
3	10 — 2	16	M	A	Dec. 10	Y	2	*S. dysenteriae*
4	10 — 2	17	F	A	Dec. 8	Y	3	Not done
5	10 — 2	16	F	A	Dec. 5	Y	8	*S. dysenteriae*
6	10 — 2	16	M	A	Dec. 6	Y	3	Not done
7	10 — 3	17	M	A	Dec. 7	Y	4	Not done
8	10 — 3	17	F	A	Dec. 8	Y	2	*S. dysenteriae*
9	10 — 3	16	F	A	Dec. 7	Y	3	Negative
10	10 — 4	17	F	A	Dec. 7	Y	2	*S. dysenteriae*
11	10 — 4	16	M	A	Dec. 8	Y	3	Not done
12	10 — 4	16	M	A	Dec. 9	Y	3	Negative
13	10 — 5	16	F	A	Dec. 8	Y	3	Not done
14	10 — 6	17	F	B	Dec. 8	Y	3	*S. dysenteriae*
15	10 — 6	16	F	B	Dec. 9	Y	2	Negative
16	10 — 7	17	F	B	Dec. 6	Y	3	Not done
17	10 — 7	17	F	B	Dec. 7	Y	5	*S. dysenteriae*
18	10 — 7	16	F	B	Dec. 8	Y	2	Negative
19	10 — 8	17	F	B	Dec. 6	Y	5	*S. dysenteriae*
20	10 — 8	17	F	B	Dec. 7	Y	3	Negative
21	10 — 9	16	M	B	Dec. 8	Y	2	Not done
22	10 — 9	16	F	B	Dec. 7	Y	3	Negative
23	10 — 9	16	F	B	Dec. 7	Y	3	*S. dysenteriae*
24	10 — 10	17	F	B	Dec. 9	Y	3	*S. dysenteriae*
25	10 — 10	17	M	B	Dec. 7	N	1	Negative
26	10 — 10	16	M	B	Dec. 6	Y	3	Not done

Questions according to steps:

1. Establish the existence of an outbreak
2. Verify the diagnosis
3. Construct a working case definition
4. Find cases systematically and record information
5. Perform descriptive epidemiology

6. Develop hypotheses
7. Evaluate hypotheses epidemiologically
8. Compare and reconcile with laboratory and/or environmental studies
9. Implement control and prevention measures
10. Conclusion: What is this disease's name, its transmission mode, and what are the contributing factors ? Number and percent of suspected, probable, and confirmed cases. Estimate of control and preventive measures.

List of gradation

N	Steps of Outbreak Investigation	Scores
1	Establish the existence of an outbreak	10
2	Verify the diagnosis	10
3	Construct a working case definition	10
4	Find cases systematically and record information	10
5	Perform descriptive epidemiology	10
6	Develop hypotheses	10
7	Evaluate hypotheses epidemiologically	10
8	Compare and reconcile with laboratory and/or environmental studies	10
9	Implement control and prevention measures	10
10	Conclusion	10
	Total	100

Clinical scenario 2.

In 2023, a previously unrecognized syndrome occurred in a small village in the North of Kazakhstan. Some people on December 1-7 of 2023 had the same complaints. This condition was characterized by severe myalgias (muscle pains) and an elevated number of a particular type of white blood cell called an eosinophil. The illness was given the name eosinophilia-myalgia syndrome. Public health officials initially used the following case definition: Eosinophil count ≥2,000 cells/mm3 in the absence of any other known cause of eosinophilia (in particular, parasitic or fungal infection, end-stage renal disease, leukemia, allergic disorder, or drug reaction) and another symptom for estimation of infectious disease.

Table 1. Persons with Suspected Eosinophilia-myalgia

Patient #	**Sex**	**Eosinophils (per mm3)**	**Eating undercooked meat**	**Severe Myalgias**	**Suspected Case**	**Probable Case**	**Confirmed Case**	Lab test for Trichinella parasite
1	M	535	No	No				negative
2	F	12,100	allergic	Yes				negative
3	F	2,310	yes	Yes				positive
4	F	2,064	yes	Yes				positive
5	M	2,250	yes	Yes				positive
6	M	1,670	No	No				negative
7	M	2,115	Leukemia	Yes				negative
8	M	3,119	yes	Yes				positive
9	M	789	no	No				negative
10	F	900	no	No				negative
11	F	3,509	Yes	Yes				positive
12	F	2,490	Yes	Yes				positive
13	M	4.307	Yes	yes				positive
14	M	3,678	Yes	Yes				positive

Estimate and fill the cells in Table 1. And answer to questions.

Questions according to steps:
1. Establish the existence of an outbreak
2. Verify the diagnosis
3. Construct a working case definition
4. Find cases systematically and record information
5. Perform descriptive epidemiology
6. Develop hypotheses
7. Evaluate hypotheses epidemiologically
8. Compare and reconcile with laboratory and/or environmental studies
9. Implement control and prevention measures
10. Conclusion: What is this disease's name, its transmission mode, and what are the contributing factors? Number and percent of suspected, probable, and confirmed cases. Estimate of control and preventive measures.

List for gradation

N	Steps of Outbreak Investigation	Scores
1	Establish the existence of an outbreak	10
2	Verify the diagnosis	10
3	Construct a working case definition	10
4	Find cases systematically and record information	10
5	Perform descriptive epidemiology	10
6	Develop hypotheses	10
7	Evaluate hypotheses epidemiologically	10
8	Compare and reconcile with laboratory and/or environmental studies	10
9	Implement control and prevention measures	10
10	Conclusion	10
	Total	100