LECTURE COMPLEX

Discipline: Public health and the foundations of evidence-based medicine
Discipline code: PHFEBM 3219
Name and code of the OP: 6B10115 "Medicine"
Amount of study hours/credits: 150/5
Course and semester of study: 3/5
The volume of lectures: 10 hours.

2025 y.

The lecture complex was developed in accordance with the working curriculum of the discipline (syllabus) " Public health and the foundations of evidence-based medicine " and discussed at a meeting of departments:

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LECTURE No. 1

1. Topic: The Concept and Objectives of Public Health.

2. Purpose: to familiarize students with modern concepts and features of the subject “Public Health”.

3. Lecture abstracts:

Public health is a science and practice aimed at protecting and improving the health of populations. Unlike clinical medicine, which focuses on the treatment of individual patients, public health emphasizes prevention, health promotion, and the creation of conditions for a healthy life in society.

Main Part

1. Definition of Public Health

According to WHO, public health is "the science and art of preventing disease, prolonging life, and promoting health through organized efforts of society."

2. Objectives of Public Health

- Disease prevention.
- Health promotion.
- Reducing health inequalities.
- Ensuring access to medical care.

3. Key Areas of Public Health

- Epidemiology.
- Health management.
- Hygiene and environmental health.
- Health economics and policy.

4. Role of Public Health in Society

- Increasing life expectancy.
- Improving the quality of life.
- Supporting sustainable socio-economic development.



Conclusion
Public health is the foundation of a healthy society. Its effectiveness depends on the interaction between healthcare systems, the state, and the population.
4. Illustrative material: presentation (14 slides are attached)
5. Literature: see Appendix 1.
6. Control questions:
1. What is public health, give its definition?
2. What is the definition of the concept of “health”?
3. peculiarities of the subject of public health from the side of clinical disciplines.

LECTURE No. 2
1. Topic: Determinants of Health
2. Purpose: to familiarize students with the demographic situation in the Republic of Kazakhstan.
3. Lecture abstracts:
Health depends not only on medical care but also on various social, economic, and environmental factors. Understanding determinants of health is crucial for effective public health policies.
Main Part
1. Groups of Health Determinants
- Biological (heredity, age, sex).
- Behavioral (nutrition, physical activity, harmful habits).
- Social (education, income, employment).
- Environmental (housing, ecology, access to clean water).
- Healthcare system (availability and quality of services).

2. WHO Concept of "Health Determinants"
- Up to 50% of health depends on lifestyle.
- 20–25% depends on the environment.
- Only about 10% depends directly on medicine.

3. Interaction of Determinants
- Poverty and low education levels increase disease risks.
- Poor ecology worsens chronic diseases.
- Healthy lifestyle reduces the impact of negative factors.

Conclusion
A comprehensive approach to determinants of health allows developing effective strategies for improving public health.
4. Illustrative material: presentation (14 slides are attached). 5.
5. Literature: see Appendix 1.
6. Control questions:
1. Define demographic indicators.
2. What does medical demography study?
3. Name the main areas of demography.
4. Name the WHO classification of human life expectancy by age.

LECTURE No. 3
1. Topic: Epidemiology as the Foundation of Public Health
2. Purpose: Social determinants of health: income, education, working conditions, housing, ecology.
3. Lecture abstracts:
Epidemiology is a key science in public health that studies the patterns, causes, and methods of controlling diseases in populations.

Main Part

1. Definition and Tasks of Epidemiology
   - Study of the distribution of diseases.
   - Identification of risk factors.
   - Development of prevention and control measures.
2. Types of Epidemiological Research
   - Descriptive (studies morbidity, mortality).
   - Analytical (identifies causes and associations).
   - Experimental (clinical trials, field research).
3. Application in Public Health
   - Monitoring and surveillance.
   - Vaccination campaigns.
   - Response to epidemics.

4. Modern Achievements
   - Modeling of disease spread.
   - Genetic epidemiology.
   - Epidemiology of chronic non-communicable diseases.

Conclusion

Epidemiology is an effective tool for making informed decisions in public health and managing health risks.

4. Illustrative material: presentation (14 slides are attached)

5. Literature: see Appendix 1.

6. Control questions:

1. Determine the incidence.
2. Name the main methods of studying morbidity.
3. Define the following concepts: primary morbidity, general morbidity, pathological susceptibility.
4. Name the reasons contributing to the increase in morbidity.

LECTURE No. 4

1. Topic : Organization of the healthcare system.

2. Purpose: Fundamentals of preventive medicine, levels of prevention: primary, secondary, tertiary.

3. Lecture abstracts:

Health policy determines the organization, financing, and functioning of healthcare systems. Effective policy ensures population health and social well-being.

Main Part

1. Health Policy Goals
   - Equal access to medical care.
   - Improving the quality of services.
   - Cost-effective use of resources.
2. Healthcare System Models
   - Beveridge model (UK, Spain).
   - Bismarck model (Germany, France).
   - Mixed systems (USA, Kazakhstan).
3. Health Financing
   - Budget financing.
   - Compulsory health insurance.
   - Private health insurance.
4. Global Trends
   - Universal Health Coverage (UHC).

- Digitalization of healthcare.
- Integration of preventive and curative care.

Conclusion
A strong health policy and efficient healthcare system are essential to improve health outcomes and achieve sustainable development.
4. Illustrative material: presentation (14 slides are attached)
5. Literature: see Appendix 1.
6. Control questions:
1. Disability, definition.
2. What diseases give the right to disability?
3. How do I get a disability in Kazakhstan?
4. By whom and for what period is disability established?

LECTURE No. 5
1. Topic : Disease prevention and health promotion.
2. Purpose: Global and national health strategies
3. Lecture abstracts:
Disease prevention is the cornerstone of public health. It aims to reduce risks, prevent illness, and create conditions for a healthier society.
Main Part
1. Levels of Prevention
   - Primary: preventing disease occurrence (vaccination, health education).
   - Secondary: early detection (screening, check-ups).
   - Tertiary: reducing complications (rehabilitation, supportive care).
2. Health Promotion Strategies
   - Healthy nutrition.
   - Physical activity promotion.
   - Anti-smoking and alcohol reduction programs.
   - Mental health support.
3. Government and Community Role
   - National prevention programs.
   - Intersectoral collaboration (education, sports, media).
   - Individual responsibility for health.
4. International Experience
   - WHO programs "Health for All."
   - European strategies against chronic diseases.
   - Successful global vaccination campaigns.

Conclusion
Prevention and health promotion are the most effective and cost-efficient ways to improve public health and quality of life.
4. Illustrative material: presentation (14 slides are attached)
5. Literature: see Appendix 1.
6. Control questions:
1. Name the levels of medical care provided to the population in the Republic of Kazakhstan.
2. What forms of medical care exist in the Republic of Kazakhstan?
3. List the types of medical care.

LECTURE No. 6
1. Topic : Contemporary Challenges to Public Health.

2. Purpose: The structure of the healthcare system, principles of organization, management models

3. Lecture abstracts:

Today, public health faces both old and new challenges: infectious diseases, chronic non-communicable diseases, environmental threats, and social inequalities.

Main Part

1. Infectious Diseases
   - Pandemics (COVID-19, Ebola, Zika).
   - Growing antimicrobial resistance.
   - Global cooperation in outbreak control.
2. Chronic Non-Communicable Diseases (NCDs)
   - Cardiovascular diseases, cancer, diabetes.
   - Main risk factors: poor diet, obesity, smoking, inactivity.
   - Long-term socio-economic consequences.
3. Global Risk Factors
   - Urbanization and megacities.
   - Climate change and environmental degradation.
   - Migration and inequality.
4. Digitalization of Healthcare
   - Telemedicine and e-health records.
   - Artificial intelligence in diagnostics.
   - Data security challenges.

Conclusion

Contemporary challenges require flexible, innovative, and interdisciplinary public health approaches. Only by uniting science, policy, and community efforts can global health be protected.

4. Illustrative material: presentation (14 slides are attached)

5. Literature: see Appendix 1.

6. Control questions:

1. What types of prevention do you know?
2. What is the main purpose of preventive medical examinations?
3. Why are screening tests conducted?

LECTURE No. 7

1. Topic : Introduction to Evidence-based Medicine (DM). Practical application in medicine.

2. Purpose: to introduce students to evidence-based medicine. To consider the areas of practical application of DM in medicine.

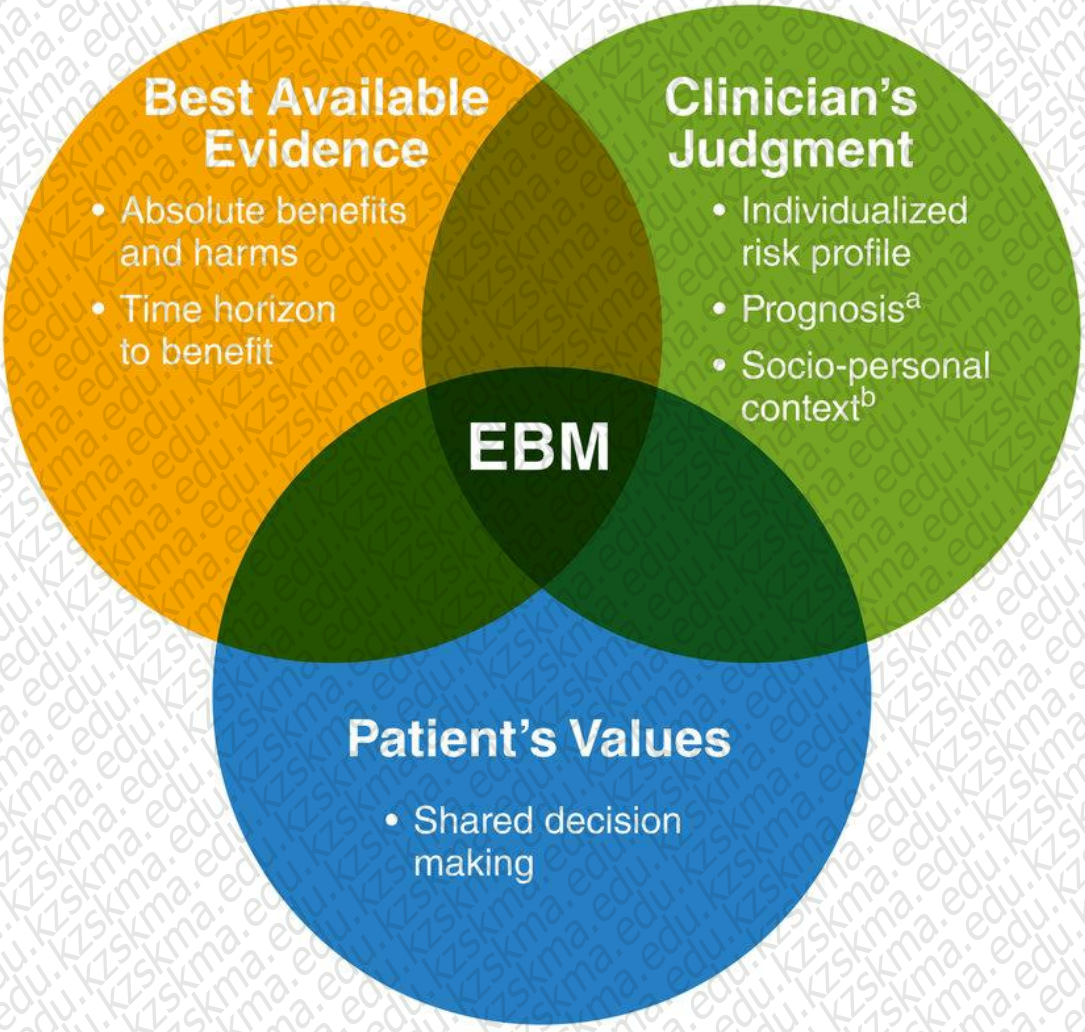
3. Lecture abstracts:

Evidence-based medicine is a branch of evidence—based medicine that involves the search, comparison, generalization and widespread dissemination of evidence obtained for use in the interests of patients (Evidence Based Medicine Working Group, 1993).

Evidence—based medicine is a new approach, direction, or technology for collecting, analyzing, summarizing, and interpreting scientific information. Evidence-based medicine provides for the conscientious, explicable and common-sense use of the best modern achievements for the treatment of each patient (Sackett D.L. et al., 1996). The main goal of introducing the principles of evidence—based medicine into healthcare practice is to optimize the quality of medical care in terms of safety, effectiveness, cost, etc. significant factors.

The term "evidence-based medicine" was first proposed in 1990 by a group of Canadian scientists from McMaster University in Toronto. The term quickly caught on in the English-language scientific literature, but at that time there was no clear definition of it. We can say that there is currently no single definition of evidence—based medicine - we find about 10 different variants in the literature.

No practicing physician has sufficient experience to be able to freely navigate through all the variety of clinical situations. One can rely on expert opinions, authoritative manuals and reference books, but this is not always reliable due to the so-called lag effect — promising therapeutic methods are introduced into practice after a considerable time after receiving evidence of their effectiveness (Antman E.T. et al., 1992). On the other hand, information in textbooks, manuals, and reference books is often outdated even before they are published, and the age of an experienced physician conducting treatment negatively correlates with the effectiveness of treatment (Sackett D.L. et al., 1991). These conclusions were obtained using the main statistical tool of evidence—based medicine, meta-analysis (V.A. Gorkov et al., 1998).



The main trends in the development of biomedical sciences are determined by the following factors:
globalization of information processes;
a large number of ongoing biomedical research;
a wide range of medicines on pharmaceutical markets;
increasing the flow of medical information (about 40,000 biomedical journals are published, publishing approximately 2 million articles annually) (Oxman A., Guyall G., 1988);
The problem of rational spending of funds in the healthcare system is acute.

These main trends determine the following needs of practical medicine:
the need for a critical assessment of information intended for practitioners and healthcare managers.;

the choice of systemic approaches for decision-making in medicine (therapeutic, diagnostic, managerial, etc.).

Therefore, there is a need to generalize biomedical knowledge and widely inform the medical community about the results of the latest research.

The potential application of the principles of evidence—based medicine in healthcare practice is significant. First of all, their application allows the use of objective criteria for all aspects of pharmacotherapy. The principles of evidence-based medicine make it possible, taking into account the latest and reliable information, to optimize the impact on decision-making of such largely subjective factors as intuition and qualifications of a doctor, opinions of reputable experts, recommendations of popular manuals and reference books. Thus, evidence-based medicine involves combining the individual clinical experience of a physician with the best available independent clinical evidence from systematic studies.

At the same time, the principles of evidence-based medicine make it possible to develop the most effective, safe and cost-effective modern therapeutic strategies that can be implemented at the state, regional, population, subpopulation and individual levels, contributing to the selection of the optimal option in each specific clinical case.

Let's focus on some aspects of the practical application of the principles of evidence-based medicine. First of all, they are applicable to improve the quality of medical care: This includes the development of clinical recommendations for practitioners and the introduction of standardization systems in healthcare.

Clinical recommendations for practitioners allow us to improve the work of a doctor in relation to the following aspects:

defining the tasks facing the doctor;

description of the disease (etiology, prevalence, clinical picture, etc.);

algorithms of diagnostic procedures (examination program, indications and contraindications for the appointment of diagnostic manipulations);

treatment (tactics, description of specific drugs and therapeutic measures, criteria for effectiveness and discontinuation of treatment); complications, prognosis, indications for hospitalization, follow-up, etc.

Implementation of standardization systems in healthcare:

the sphere of drug circulation;

development and application of medical equipment;

development of a formulary system (protocols for the management and treatment of patients);

development and use of protocols in insurance medicine;

determination of the relative value of various sources of information in relation to the search for answers to clinical questions.

An important aspect of evidence-based medicine is to determine the degree of reliability of information: research results that are used as a basis for systematic reviews.

The Center for Evidence-based Medicine in Oxford has developed the following definitions of the degree of reliability of the information provided:

A. High reliability — information is based on the results of several independent clinical trials (CI) with overlapping results summarized in systematic reviews.

B. Moderate reliability — information is based on the results of at least several independent, similar CI goals.

C. Limited reliability — information is based on the results of a single CI.

D. There is no rigorous scientific evidence (CI were not carried out) — a certain statement is based on the opinion of experts.

According to the Swedish Council on Evaluation Methodology in Healthcare, the reliability of evidence from different sources is not the same and decreases in the following order (Li Wan Po, 1998):

1) randomized controlled trial;

2) non-randomized CI with simultaneous control;

3) Non-randomized CI with historical control;

4) Cohort study;

5) Case—control study;

6) Cross-CI;
7) the results of observations;
8) description of individual cases.
Search and analysis of evidence-based information
Information search in the field of evidence-based medicine requires the researcher to have relevant experience and use a systematic approach. To successfully search for the necessary information on evidence-based medicine, it is of great importance to select available clinical databases (MedLine, Cochrane Library, Adonis, etc.) and develop an adequate search methodology (by keywords or phrases, names of authors, etc.).
4. Illustrative material: presentation (14 slides are attached)
5. Literature: see Appendix 1.
6. Control questions:
1. What does the term evidence-based medicine mean?
2. What are the basic principles of DM?
3. Where is DM used?
4. What are the features of practical application in medicine?

LECTURE No. 8
1.Topic: Basic Principles and Methodology of Evidence-Based Medicine
2. Purpose: To familiarize students with the basic principles and methodology of evidence-based medicine (EBM).
3. Lecture abstracts:
It is interesting to note that the need for professional medical information arises in a physician up to 60 times a week (or twice for every three patients) and may influence at least eight decisions daily.
In real clinical practice, there is often a dilemma: what is more important for making a clinical decision — recommendations based on clinical research or a doctor's reasoning and experience applied to a specific patient?
The answer to this question may seem contradictory to many critics of the EBM concept (see Figure 2). However, paradoxically, the "triad" shown in the figure best reflects the modern understanding of evidence-based medicine.
A competent clinician always uses both personal clinical experience and the most current, evidence-based data from medical science — simultaneously and never separately.
It is quite obvious that relying solely on data from evidence-based medicine, without considering personal experience and the characteristics of an individual patient, can lead to errors in patient management.
At the same time, relying only on personal experience may deprive the patient of the most advanced and effective treatment, which can also harm their health.
The introduction and proper application of EBM principles provide a number of objective advantages (Figure 3).
According to modern professional standards, a properly trained doctor must, first, be able to distinguish between evidence-based information and descriptive or purely promotional information.
Second, they must strive to use only those medical interventions in their daily practice that have a strong evidence base.
Solving these tasks is impossible without knowledge of how to search for high-quality medical information and skills for applying it to a specific clinical situation (Figure 4).
Thus, the success of this search largely depends on the physician's ability to clearly formulate the question they are seeking to answer.
Moreover, identifying the most valuable information is impossible without access to modern medical information sources, leading journals, and electronic databases.
Fortunately, an easier way exists — clinical guidelines developed by professional associations significantly reduce search time and help practicing physicians stay informed about the most important global medical trends.

4.Illustrative material: presentation (15 slides attached)
5.Literature: see Appendix 1.
6.Control questions:
1. What does the methodology of EBM include?
2. What are the main principles of EBM?
3. What are the features of the basic principles of EBM?

LECTURE No. 9
1.Topic : Hierarchy of Evidence. Evidence Pyramid. Levels of Credibility (ABCD)
2. Purpose: To characterize the hierarchy of evidence in clinical research and its role in medical decision-making. To introduce the evidence pyramid.
3. Lecture abstracts:
After studying the main research designs, it is important to determine how strong the evidence of each type of study is.
For this purpose, in the early 1990s, a hierarchy of evidence for clinical studies was proposed.
In this hierarchy, studies are divided into four classes, designated by Roman numerals (I, II, III, IV) or Latin letters (A, B, C, D).
According to this classification, the quality (and therefore the evidential strength) of a clinical study increases as the class number decreases.
Thus, the most reliable evidence comes from studies in category I (A), and the least reliable — from category IV (D).
Characteristics of each class:
Class (Level) I (A): large double-blind placebo-controlled studies, as well as data obtained from meta-analyses of several randomized controlled trials (RCTs).
Class (Level) II (B): small randomized controlled studies with statistical data based on a small number of patients.
Class (Level) III (C): non-randomized clinical studies involving a limited number of patients.
Class (Level) IV (D): expert group consensus on a specific issue.
Later, another classification was proposed, dividing clinical studies into five classes (1–5).
As in the previous classification, the quality of evidence increases as the number decreases (the most reliable is 1, the least — 5).
Each class is further divided into two subclasses (a, b):
subclass b corresponds to a single clinical study,
subclass a — to a systematic review (or a series) of several such studies.
For example, a case-control study (CCS) belongs to class 3b, while a systematic review of CCS belongs to class 3a.
Since a systematic review combines several studies, 3a has stronger evidence than 3b.
Levels of Evidence in Clinical Studies:
1a – Systematic review of RCTs
1b – Randomized Controlled Trial (RCT)
2a – Systematic review of cohort studies
2b – Cohort study
3a – Systematic review of case-control studies
3b – Case-control study
4 – Cross-sectional study
5a – Series of clinical cases
5b – Single clinical case
4.Illustrative material: presentation (14 slides attached)
5.Literature: see Appendix 1.
6.Control questions:

1. What are the features of the hierarchy of evidence?
2. What is included in the evidence pyramid?
3. What do the levels of credibility (ABCD) include?

LECTURE No. 10

1.Topic: Medical Electronic Databases (EDB) Meeting Evidence Criteria

2. Purpose: To familiarize students with medical electronic databases that meet evidence-based criteria.

3. Lecture abstracts:

Nowadays, medicine has significantly expanded in terms of diagnostic and treatment methods.
The volume of patient health information that physicians must remember and process continues to grow.
Moreover, information about a patient's health is often spread across several healthcare institutions providing care.
All this creates the need for data integration.
The ever-growing amount of information makes it increasingly difficult to organize and systematize.
Every day, healthcare institutions deal with numerous important tasks related to entering, processing, and storing medical data and managing information flows.
To process the continuously increasing amount of data, databases (DBs) are used — for efficient tracking of all stages of patient care: admission → diagnosis → treatment → rehabilitation → monitoring.
Working with structured data is easier, which is why databases play a central role in medical information systems (MIS).
Definition:
A database is a collection of data stored according to a defined structure, manipulated according to data modeling rules.
Classification of databases:
By type of stored information:
Factual (e.g., card indexes)
Documentary (e.g., archives)
By storage method:
Centralized — stored on one computer
Distributed — used in local or global computer networks
By data organization structure:
Tabular (relational): data is organized in rectangular tables, and all operations are performed on these tables
Hierarchical: records are arranged in a certain sequence, and data search occurs by moving "down" from one level to another, similar to hierarchical file systems
Stages of database creation:
1. Theoretical design stage:
Define what tables the DB will contain
Define the structure of each table (fields, type, and size)
Choose primary keys for each table
2. Structure creation stage:
Describe the structure of tables
3. Data entry stage:
Fill the tables with information
Medical database — a large, well-structured set of medical data using unified methods for data processing in various medical areas.
Medical Information Systems (MIS) usually include the following databases:
Databases of insured populations receiving care and medication benefits
Databases of patients with socially significant diseases

Medical-statistical databases of personalized medical services, including outpatient, inpatient, emergency, and dental care
Financial and economic databases
Databases on staffing and technical equipment of healthcare institutions
Pharmacoeconomic databases
Databases of regulatory and reference information

4.Illustrative material: presentation (14 slides attached)

5.Literature: see Appendix 1.

6.Control questions:

1. What medical electronic databases do you know?
2. What are the advantages of using medical electronic databases?
3. What are the criteria for evidence-based databases?

Appendix 1

Literature:

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