"The Orenburg state medical University"

**KNOWLEDGE CONTROL   
for module 1 “General epidemiology”**

DISCIPLINE "EPIDEMIOLOGY"

WITH STUDENTS OF THE 5TH COURSE

OF THE FACULTY OF FOREIGN STUDENTS

Methodical recommendations are developed

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# Lesson 1. Introduction to epidemiology

## Incoming control

|  |  |
| --- | --- |
| **Task**  Indicate the contribution of scientists to the development of modern epidemiology. | **Answer** |
| John Snow |  |
| Angelerio |  |
| Hippocrates |  |
| G. Fractorius |  |
| William Farr |  |

## Output control

Select ONE listed answer that is the right in each case:

1. AN APPROPRIATE DEFINITION OF EPIDEMIOLOGY AS A SCIENCE IS

1) the science of epidemics

2) the study of outbreaks

3) the study of the distribution and determinants of healthrelated states and events in specified populations and the application of this study for the control of health problems

4) the medical science, which investigates the causes of occurrence and spread of communicable diseases in the human society and applies this knowledge for fighting and prevention of these diseases.

2. EPIDEMIOLOGY OF INFECTIOUS DISEASES IS

1) the branch of epidemiology, which investigates the causes of occurrence and spread of communicable diseases in the human society and applies this knowledge for fighting and prevention of these diseases

2) the science of epidemics

3) the study of outbreaks

4) the study of the distribution and determinants of healthrelated states and events in specified populations and the application of this study for the control of health problems.

3. EPIDEMIOLOGY OF NONINFECTIOUS DISEASES

(NONCOMUNICABLE DISEASES) IS

1) the application of epidemiological method for investigation of noninfectious diseases

2) the branch of epidemiology, which investigates the causes and determinants of occurrence and spread distribution and determinants of noninfectious diseases and other health-related

states and events in specified populations and the application of this study for the control of health

3) the study of the distribution and determinants of healthrelated states and events in specified populations and the application of this study for the control of health problems

4) the science of epidemics

4. THE METHOD USED IN EPIDEMIOLOGY OF INFECTIOUS DISEASES IS

1) bacteriological method

2) statistical method

3) epidemiological method

4) logistic method

5. EPIDEMIOLOGICAL APPROACH MEANS TO INVESTIGATE HUMAN'S PATHOLOGY

1) at individual level

2) at molecular and genetic level

3) at cellular level

4) at population level

6. EPIDEMIOLOGY INVESTIGATES

1) all diseases and health-related states and events

2) only infectious diseases

3) only noninfectious diseases

4) chronic diseases

7. THE CONCEPT OF MIASM WAS CREATED BY

1) Hippocrates

2) G. Fracastorius

3) D. Samoylovich

4) J.Graunt

8. THE AUTHOR OF THE CONCEPT OF CONTAGION IS

1) Hippocrates

2) T. Sydenhame

3) G. Fracastorius

4) D. Samoylovich

9. THE FIRST RUSSIAN EPIDEMIOLOGIST KNOWN FOR THE WORKS ON STUDYING OF CONTAGIOUS DISEASES WAS

1) D. Samoylovich

2) D. Ivanovsky

3) L. Gromashevsky

4) N. Pavlovsky

10. THE FIRST IMMUNIZATION AGAINST SMALLPOX BY A PREPARATION CONTAINING VACCINIA VIRUS WAS CONDACTED IN 1796 BY

1) E. Jenner

2) L. Paster

3) G. Ramon

4) R. Berring

11. RABIES LIVE VACCINE WAS CREATED BY

1) E. Jenner

2) L. Paster

3) G. Ramon

4) R. Koch

12. THE FIRST FAMOUS ANALITIC INVESTIGATION OF THE ORIGINS OF CHOLERA EPIDEMIC IN LONDON (1855) WAS CONDUCTED BY

1) W. Farr

2) J. Snow

3) R. Koch

4) E. Jenner

13. MODERN STRUCTURE OF EPIDEMIOLOGY INCLUDES TWO FOLLOWING MAIN BRANCHES:

1) epidemiology of infectious diseases and epidemiology of noninfectious diseases

2) general epidemiology and epidemiology of different nosological groups

3) clinical epidemiology and military epidemiology

4) descriptive epidemiology and analytic epidemiology

14. DESCRIPTIVE TYPE OF EPIDEMIOLOGICAL STUDIES

1) identifies causal relationships or factors associated with disease

2) estimates the effectiveness of treatment and prophylactic means and measures

3) characterizes the distribution of cases in relation to person, place, and time

15. ANALITIC TYPE OF EPIDEMIOLOGICAL STUDIES

1) identifies causal relationships or factors associated with disease

2) estimates the effectiveness of treatment and prophylactic means and measures

3) characterizes the distribution of cases in relation to person, place, and time

16. EXPERIMENTAL TYPE OF EPIDEMIOLOGICAL STUDIES

1) identifies causal relationships or factors associated with disease

2) estimates the effectiveness of treatment and prophylactic means and measures

3) characterizes the distribution of cases in relation to person, place, and time

17. ANALYTIC TYPE OF EPIDEMIOLOGICAL STUDIES MAYBE

1) only retrospective

2) only prospective

3) retrospective and prospective

Choose ALL correct answers:

18. THE MAIN GOALS OF EPIDEMIOLOGY ARE THE FOLLOWING:

1) characterising the frequency and distribution of diseases and other conditions in population

2) identifying factors causing the occurrence and spread of diseases

3) providing the surveillance of diseases (communicable and noncommunicable) and other conditions

4) evaluating prophylactic means and measures

5) reducing the morbidity and mortality from infectious diseases, preventing the occurrence and spread of communicable diseases

19. EXAMPLES OF THE DESCRIPTIVE STUDIES AMONG LISTED BELOW:

1) cross-sectional survey

2) case series report

3) cohort study

4) case report

20. EXAMPLES OF THE ANALITIC STUDIES AMONG LISTED BELOW:

1) cross-sectional survey

2) case-control study

3) cohort studies

4) randomized clinical trials

21. EXAMPLES OF THE CONTROLED EXPERIMENTAL STUDIES AMONG LISTED BELOW:

5) case-control study

6) field trial

7) cohort studies

8) randomized clinical trial

22. EXPERIMENTAL TYPE OF EPIDEMIOLOGICAL STUDIES INCLUDES

1) cohort study

2) controlled epidemiological experiment

3) uncontrolled epidemiological experiment

4) “natural” experiment

23. EXPERIMENTAL TYPE OF EPIDEMIOLOGICAL STUDIES MAY BE

1) blinded

2) double blinded

3) three times blinded

4) four times blinded

24. EPIDEMIOLOGY IS BASED ON THE FOLLOWING FUNDAMENTAL ASSUMPTIONS:

1) diseases do not occur by chance

2) diseases occur by chance

3) diseases are distributed randomly in the population

4) diseases are not distributed randomly in the population, thus, their distribution indicates something about how and why that disease process has occurred

25. EPIDEMIOLOGICAL APPROACH USED TO INVESTIGATE HUMAN'S PATHOLOGY INCLUDES:

1) investigation at the individual level

2) investigation at the level of population

3) complex investigation

4) integration of many methods from different disciplines

5) using the only specific method

26. MATCH THE TYPES OF EPIDEMIOLOGICAL STUDIES LISTED IN THE LEFT COLUMN WITH THE EXAMPLES OF DIFFERENT EPIDEMIOLOGICAL STUDIES:

|  |  |
| --- | --- |
| Types of epidemiological studies | Examples of different epidemiological  studies |
| 1. descriptive  2. analytic  3. experimental | a) cohort studies  b) case reports  c) clinical trials  d) populations (correlation) studies  e) case-control studies  f) field trials |

27. MATCH THE TYPES OF EPIDEMIOLOGICAL ANALITIC STUDIES LISTED IN THE LEFT COLUMN WITH THEIR APPLICATION:

|  |  |
| --- | --- |
| Types of epidemiological analytic studies | Applications of different  epidemiological analytic studies |
| 1. case-control study  2. cohort study | a) for the examination of multiple  etiologic factors for a single disease  b) for the examination of multiple  effects of a single exposure  c) for the elucidation of temporal  relationship  d) for the evaluation of diseases in long  latent periods  e) for the evaluation of rare etiologic  factors  f) for the evaluation of rare disease |

Complete the sentences

28\* DESCRIPTIVE AND ANALYTIC STUDIES ARE \_\_\_\_\_\_\_\_ STUDIES, BECAUSE INVESTIGATORS DON’T INFLUENCE THE RESULTS BY ANY MEANS AND MEASURE.

29. EXPERIMENTAL STUDIES ARE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_STUDIES, BECAUSE INVESTIGATORS CAN INFLUENCE THE INDIVIDUALS BY USING THE MEANS OR TAKING MEASURES.

30. THE BEST WAY TO SEPARATE PARTICIPANTS OF THE CONTROLLED EPIDEMIOLOGICAL EXPERIMENT TO THE TREATMENT GROUP AND THE PLACEBO GROUP IS \_\_\_\_\_\_\_\_\_ .

# Lesson 2. Epidemiological diagnosis

## Incoming control

|  |  |
| --- | --- |
| **Task** | **Answer** |
| Write a formula for calculating the incidence |  |
| Draw a chart to illustrate the dynamics of the incidence |  |
| Draw a chart to illustrate the percentage indicators. |  |
| The incidence of the population of city A is 10 0/0000, and city B - 15 0/0000 with p = 0.2. Rate the accuracy of the differences indicators. |  |
| Specify the value of p, if Chi‑square=3.86. |  |

## Intermediate control

**Task 1.** Build a graph of the dynamics of the incidence of the population of the city A. Assess the long-term incidence trend.

|  |  |  |  |
| --- | --- | --- | --- |
| **year** | **cases** | **nP** | **I** |
| 2000 | 11 | 200 000 | 5,5 |
| 2001 | 13 | 200 000 | 6,5 |
| 2002 | 14 | 200 000 | 7,0 |
| 2003 | 15 | 200 000 | 7,5 |
| 2004 | 13 | 200 000 | 6,5 |
| 2005 | 9 | 200 000 | 4,5 |
| 2006 | 7 | 200 000 | 3,5 |
| 2007 | 12 | 200 000 | 6,0 |
| 2008 | 14 | 200 000 | 7,0 |
| 2009 | 18 | 200 000 | 9,0 |
| 2010 | 17 | 200 000 | 8,5 |
| 2011 | 15 | 200 000 | 7,5 |
| 2012 | 13 | 200 000 | 6,5 |
| 2013 | 11 | 200 000 | 5,5 |
| 2014 | 14 | 200 000 | 7,0 |
| 2015 | 17 | 200 000 | 8,5 |
| 2016 | 19 | 200 000 | 9,5 |
| 2017 | 12 | 200 000 | 6,0 |

**Task 2.** Build a graph of monthly incidence. Indicate the months of recovery.

|  |  |  |  |
| --- | --- | --- | --- |
| **months** | **cases** | **nP** | **I** |
| 1 | 13 | 200 000 | 6,5 |
| 2 | 15 | 200 000 | 7,5 |
| 3 | 10 | 200 000 | 5,0 |
| 4 | 6 | 200 000 | 3,0 |
| 5 | 2 | 200 000 | 1,0 |
| 6 | 2 | 200 000 | 1,0 |
| 7 | 2 | 200 000 | 1,0 |
| 8 | 2 | 200 000 | 1,0 |
| 9 | 5 | 200 000 | 2,5 |
| 10 | 6 | 200 000 | 3,0 |
| 11 | 12 | 200 000 | 6,0 |
| 12 | 17 | 200 000 | 8,5 |

**Task 3.** Find the area of risk of morbidity. Build a graph.

|  |  |
| --- | --- |
| **Cities** | **I** |
| Q | 5,5 |
| W | 6,5 |
| E | 7,0 |
| R | 7,5 |
| T | 6,5 |
| Y | 4,5 |
| U | 3,5 |
| I | 6,0 |
| O | 7,0 |
| P | 9,0 |
| A | 8,5 |
| S | 7,5 |
| D | 6,5 |
| F | 5,5 |
| G | 7,0 |
| H | 8,5 |
| J | 9,5 |
| K | 6,0 |

**Task 4.** Which population group is most at risk of morbidity? Build graphics.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Case** | **%** |  | **nP** | **I, о/оооо** |
| **townspeople** | 78 | 58,2 |  | 400 000 |  |
| **villagers** | 56 | 41,8 |  | 7 000 000 |  |

## Output control

**Task.** There are “M” students in school number 28. “N” people were sick during the period from October to April in this school. But in school number 15 – “P” students were ill. There are “Q” students in school number 15. Are there any differences between incidence rates?

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Var.** | M | N | P | Q | **I-28** | **measure** | **I-15** | **measure** | **χ2=** | **Difference (+/-)** |
| 1 | 1000 | 300 | 170 | 800 |  |  |  |  |  |  |
| 2 | 200 | 60 | 70 | 400 |  |  |  |  |  |  |
| 3 | 550 | 50 | 13 | 490 |  |  |  |  |  |  |
| 4 | 250 | 90 | 40 | 250 |  |  |  |  |  |  |
| 5 | 300 | 60 | 30 | 700 |  |  |  |  |  |  |
| 6 | 400 | 100 | 50 | 600 |  |  |  |  |  |  |
| 7 | 600 | 90 | 30 | 500 |  |  |  |  |  |  |
| 8 | 700 | 150 | 20 | 400 |  |  |  |  |  |  |
| 9 | 800 | 200 | 30 | 300 |  |  |  |  |  |  |
| 10 | 900 | 300 | 150 | 900 |  |  |  |  |  |  |
| 11 | 300 | 10 | 300 | 1000 |  |  |  |  |  |  |
| 12 | 400 | 50 | 200 | 700 |  |  |  |  |  |  |
| 13 | 600 | 200 | 400 | 800 |  |  |  |  |  |  |
| 14 | 700 | 150 | 30 | 500 |  |  |  |  |  |  |
| 15 | 800 | 350 | 20 | 400 |  |  |  |  |  |  |

# Lesson 3. Clinical epidemiology and evidence-based medicine (part 1)

## Incoming control

|  |  |
| --- | --- |
| **Task** | **Answer** |
| What’s goal of clinical epidemiology? |  |
| What are the main reasons for applying the EBM? |  |
| Define PICO. |  |
| What does it mean – RCT? |  |
| Which two groups are required for RCT? |  |

## Intermediate control

|  |  |
| --- | --- |
| **Task 1** | **Answer** |
| Draw a case-control study map. |  |
| Invent and arrange numerical values so that the disease is a consequence of exposure to a risk factor. |  |
| Build a 2x2 table. Fill it in. |  |
| Calculate   * absolute risks * RR * AR * Ef |  |
| Calculate Chi-square |  |

**Task 2.** There are “**M**” students in school number 28.   
“**N**” people were sick during the period from October to April in this school.   
But in school number 15 – “**P**” students from “**Q**” pupils were ill.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **M=** | **N=** | **P=** | **Q=** |
| **V.1** | 1000 | 300 | 170 | 800 |
| **V.2** | 200 | 60 | 70 | 400 |
| **V.3** | 550 | 10 | 13 | 490 |
| **V.4** | 250 | 90 | 40 | 250 |

* Calculate incidence rates (per 1000) for each school.
* Assess the reliability of their differences (build a four-field table, make calculations on the computer).
* The answer should look like this:
  + four-field table;
  + I28=… 0/00;
  + I15=… 0/00;
  + χ2=… (р…0,05);
  + the differences are reliable (or not reliable)

## Output control

**Task.** This was cohort study. There were two workshops. There was a lot of noise in the first workshop. "U" people worked in this workshop, "W" of whom lost their hearing. "X" people lost their hearing in the second workshop. Calculate the indicators. Is there a risk factor in the first workshop? In total, the factory employed "Y" people.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Var.** | U= | W= | X= | Y= | **Rex=** | **Runex=** | **χ2=** | **OR=** | **RR=** | **Is there a risk? (+/-)** |
| 1 | 200 | 40 | 12 | 960 |  |  |  |  |  |  |
| 2 | 210 | 50 | 8 | 950 |  |  |  |  |  |  |
| 3 | 220 | 60 | 10 | 940 |  |  |  |  |  |  |
| 4 | 230 | 70 | 6 | 930 |  |  |  |  |  |  |
| 5 | 240 | 40 | 12 | 920 |  |  |  |  |  |  |
| 6 | 250 | 50 | 8 | 910 |  |  |  |  |  |  |
| 7 | 260 | 60 | 10 | 900 |  |  |  |  |  |  |
| 8 | 270 | 70 | 6 | 890 |  |  |  |  |  |  |
| 9 | 280 | 40 | 12 | 880 |  |  |  |  |  |  |
| 10 | 290 | 50 | 8 | 870 |  |  |  |  |  |  |
| 11 | 300 | 60 | 10 | 860 |  |  |  |  |  |  |
| 12 | 310 | 70 | 6 | 850 |  |  |  |  |  |  |
| 13 | 320 | 40 | 12 | 840 |  |  |  |  |  |  |
| 14 | 330 | 50 | 8 | 830 |  |  |  |  |  |  |
| 15 | 340 | 60 | 10 | 820 |  |  |  |  |  |  |
| **Additional question**: Calculate the incidence rate in the plant. | | | | | | | | | | |

# Lesson 4. Clinical epidemiology and evidence-based medicine (part 2)

## Incoming control

|  |  |
| --- | --- |
| **Task** | **Answer** |
| Draw a case-control study map. |  |
| Invent and arrange numerical values so that the disease is a consequence of exposure to a risk factor. |  |
| Build a 2x2 table. Fill it in. |  |
| Calculate OR |  |
| Calculate Chi-square |  |

## Output control

**Task.** In the summer camp, where F people rested, food poisoning occurred. Epidemiologist suspects two dishes - soup and salad. The soup was consumed by H people, G of whom felt bad. Salad was eaten by S, of which T poisoned. In total, the camp has poisoned U people. Determine which product caused the outbreak.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **soup** | | **salad** | |  |
| Var. | F= | H= | G= | S= | T= | **χ2=** | **OR=** | **χ2=** | **OR=** | **reason** |
| 1 | 1800 | 450 | 14 | 150 | 51 |  |  |  |  |  |
| 2 | 1700 | 400 | 30 | 160 | 6 |  |  |  |  |  |
| 3 | 1600 | 350 | 21 | 170 | 48 |  |  |  |  |  |
| 4 | 1500 | 400 | 20 | 180 | 47 |  |  |  |  |  |
| 5 | 1400 | 400 | 46 | 190 | 9 |  |  |  |  |  |
| 6 | 1300 | 300 | 23 | 180 | 8 |  |  |  |  |  |
| 7 | 1200 | 300 | 34 | 170 | 4 |  |  |  |  |  |
| 8 | 1100 | 250 | 16 | 160 | 43 |  |  |  |  |  |
| 9 | 1000 | 250 | 15 | 150 | 42 |  |  |  |  |  |
| 10 | 900 | 200 | 24 | 140 | 8 |  |  |  |  |  |
| 11 | 800 | 200 | 13 | 130 | 40 |  |  |  |  |  |
| 12 | 700 | 150 | 24 | 120 | 7 |  |  |  |  |  |
| 13 | 600 | 150 | 11 | 110 | 38 |  |  |  |  |  |
| 14 | 500 | 100 | 10 | 90 | 37 |  |  |  |  |  |
| 15 | 400 | 100 | 9 | 80 | 36 |  |  |  |  |  |

Additional question: Calculate the incidence rate in the camp.

# Lesson 3. Clinical epidemiology and evidence-based medicine (part 3)

## Incoming control

|  |  |
| --- | --- |
| **Task (give definition)** | **Answer** |
| * Systematic reviews |  |
| * Meta-analysis |  |
| * Validity |  |
| * Reliability |  |
| * The GRADE system |  |
| * Databases |  |

## Output control

1. True Positive (TP):
   1. Have the disease and test positive
   2. Do not have the disease but test positive
   3. Have the disease but test negative
   4. Do not have the disease and test negative
2. False Positive (FP):
   1. Have the disease and test positive
   2. Do not have the disease but test positive
   3. Have the disease but test negative
   4. Do not have the disease and test negative
3. False Negative (FN):
   1. Have the disease and test positive
   2. Do not have the disease but test positive
   3. Have the disease but test negative
   4. Do not have the disease and test negative
4. True Negative (TN):
   1. Have the disease and test positive
   2. Do not have the disease but test positive
   3. Have the disease but test negative
   4. Do not have the disease and test negative
5. Have the disease and test positive
   1. a
   2. b
   3. c
   4. d
6. Do not have the disease but test positive
   1. a
   2. b
   3. c
   4. d
7. Have the disease but test negative
   1. a
   2. b
   3. c
   4. d
8. Do not have the disease and test negative
   1. a
   2. b
   3. c
   4. =
9. Sensitivity
   1. a/c
   2. b/d
   3. a/b
   4. d/c
10. Specificity
    1. a/c
    2. b/d
    3. a/b
    4. d/c
11. Do not have the disease and test negative
    1. a/(a+b)
    2. b/(a+b)
    3. c/(c+d)
    4. d/(c+d)
12. Negative predictive value
    1. a/(a+b)
    2. b/(a+b)
    3. c/(c+d)
    4. d/(c+d)