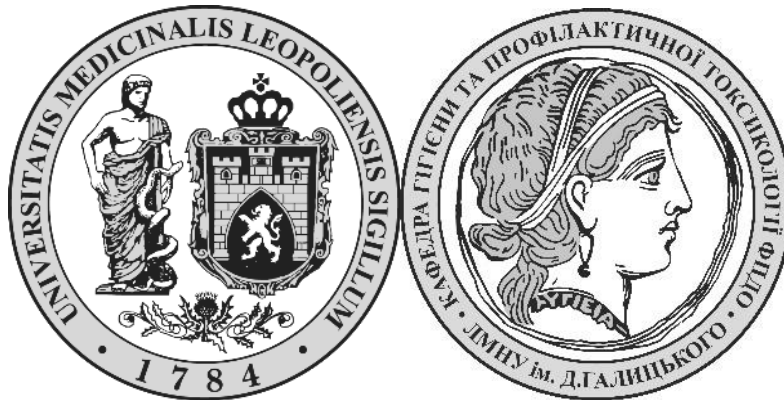


**MINISTRY OF HEALTH OF UKRAINE  
DANYLO HALYTSKIY LVIV NATIONAL MEDICAL  
UNIVERSITY**

**Department of hygiene and prophylactic toxicology FPGE**



**HYGIENE AND ECOLOGY**

**Methodical guidelines  
for practical classes and independent work  
for the 6-year english medium students  
of faculty of Foreign Students  
of the second (master's) level of higher education  
field of knowledge 22 «Health Care»  
Specialty 222 “Medicine”**

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The methodical guidelines have been considered and approved by the Methodical Commission of the Preventive Medicine.

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## **PRACTICAL CLASSES**

### **TOPIC 1.**

#### ***METHODOLOGICAL, METHODICAL PRINCIPLES OF STUDYING AND RISK ASSESSMENT OF ENVIRONMENTAL FACTORS INFLUENCE ON POPULATION HEALTH. PREVENTIVE TOXICOLOGY. PRINCIPLES AND METHODS OF HYGIENIC STANDARDIZATION OF HARMFUL CHEMICAL SUBSTANCES IN DIFFERENT ENVIRONMENTAL OBJECTS.***

##### **Actuality of theme**

Hygiene is a science, which studies of regularities of various environmental factors influence on population and individual health with the aim of substantiation of hygienic standards, sanitary roles and preventive measures intended for assurance of optimal conditions of vital activity, health improved and prevention of diseases. A prophylactic work on a domestic, territorial or shopfloor area rank important place no less than medical and diagnostic work in activity of doctor of medical type. Prophylactic activity of doctor is based on methodological and methodical principles of hygienic diagnostics, which foresees the correct estimation of levels of environmental factors exposure on the individual or investigated population, diagnostics of the state of population health, in particular, health of supersensible sub-groups and individuals, establishing an objective cause-effect relations between the influence of environmental factors and possible changes of health. The various (demographic, statistical, epidemiological, clinical, experimental) methods are used for carrying out of hygienic diagnostics. The most modern method among above mentioned is risk assessment of unfavorable influence of environmental factors on health – identification of probability of undesirable effect development in certain levels and duration of harmful factor influence.

The wide use of chemical compounds in the vital functions of man causes intensive contamination of environment and origin of diseases of chemical etiology. Scientific ground and practical application of hygienical norms – maximum allowable concentrations (MAC) prevents the harmful action on the organism of chemical pollutants. The hygienical standardization of xenobiotic in the different objects of environment is characterized certain features which are conditioned a necessity to take into account all of possible negative consequences of its influence on an environment and human organism.

##### **Learning aims**

To know the methodological and methodical principles of hygiene, the role of environmental factors in etiology of different diseases, the theoretical bases and the general scheme of influence of complex of environmental factors on a population health, the main definitions and the content of stages of risk assessment methodology, methodical approaches to risk assessment of harmful influence of environmental factors on population health; basic principles and methods of scientific ground of hygienical norms of harmful chemical matters, basic parameters of toxicometry, chart of toxicological experiment, features of hygienical standardization of xenobiotic in the different objects of environment

Able to make the program of epidemiological research from an exposure and estimation of correlation between environmental factors and population health, to carrying out the integral estimation of the state of environment and health; to identify a risk factor, its harmful consequences for health, to calculate the relative and population risk for population; to estimate the basic parameters of toxicometry of chemical matters, to define critical indicator of harmfulness and to interpret the results of experimental researches, to ground of MAC of chemical matters in the different objects of environment, to estimate the type of the combined action of xenobiotics, to expect and estimate the actual intake and actual dose of toxic matters, in particular pesticides and nitrates.

### **Base knowledge, abilities and skills**

Hygiene as a science, its purpose, tasks, object of study, connections with other sciences; sanitation, sanitary legislation of Ukraine; the classification of methods of hygienic research; the specific methods of hygiene [general hygiene]; the general philosophic laws and categories, their value for hygiene [philosophy, general hygiene]; the definition of “health”, “individual health”, “population health”, the basic criteria and statistical health indices, their dynamics and tendency in Ukraine and in the world, information sources about health; methods of reliable estimate of results of medical and statistical researches [social medicine]; an epidemiological method of research, its types [general hygiene, epidemiology]; methods of hygienic estimation of unfavorable effect of environmental factors on human health [general hygiene].

Basic principles of the hygienical standardization of xenobiotics, independent and complex standardization, stages of hygienical estimation of chemical matters, chart of toxicological experiment (acute, subacute and chronic experiments), basic parameters of toxicometry (accumulation, threshold doses and concentrations, remote effects), indexes of the functional state of organism and its separate systems at the action of xenobiotics, methods of their determination; classification of harmful matters on the degree of toxicness and accumulation; a concept about a hygienical norm, MAC; combined, complex, and joint action of environmental factors; a role of the hygienical standardization of xenobiotics in different environments [general hygiene].

### **Content of theme**

Theoretical bases of hygiene, contribution of national scientists in their scientific substantiation. The general philosophic and subject methodology of hygiene. The significance of hygiene for forming of professional thought and practical activity of doctors of medical type.

Role of environmental factors as an etiologic (causal) factors and risk factors of development of different diseases. The determined and stochastic (possibilistic) effects in human organism under influence of environmental factors. Hygienic diagnostics. Ecological-dependent diseases, methods of their prognostication and prophylaxis. The methodology of high-quality (conceptual) and quantitative integral estimation of the state of environment and health. Population health as an integral criterion for environment estimation. Prognostication of changes of population health by means of the estimation of state contamination of atmospheric air, water, soil. The methods of establishment of correlations between the state of environment and health. General scheme of epidemiological research of identification and estimation of correlation between environmental factors and health.

Risk assessment methodology. Problem characteristics and main definitions. Main stages of risk assessment methodology: identification of harmful factors, exposure assessment, determine “dose-response” relationships for carcinogens and non-carcinogens, risk characterization, risk management. Direct and indirect methods of exposure assessment, biomarkers of exposure, effect and susceptibility. Problems of application of risk assessment methodology in Ukraine.

Object and tasks of prophylactic toxicology. Concept about toxicokinetics, toxicodynamics, toxicometry. Toxicness and accumulation of xenobiotics. Modern idea about accumulation, methods of its estimation. Classification of industrial pollutants and pesticides after the degree of toxicness and danger. A concept about the maximum allowable concentrations (MAC) of exogenous chemical matters, acceptable daily intake (ADI) and acceptable daily dose (ADD) in food rations, features of the independent hygienical standardization. Critical indicator of harmfulness of pollutants in different environments. Complex standardization of pesticides. Types of the combined action of matters. Legislatively normative documents in industry of the hygienical regulation.

## Pre-class self-training work

### Control questions

1. Hygiene as a science, its purpose, tasks. Sanitation, its legislative base. The specific methods of hygiene. The classification of methods of hygienic research. Definition of health according to WHO. General pathological definition of health. Population and individual health. Health indices. Prophylaxis, its types. Role of hygiene and prophylaxis in work of doctors of medical type.
2. Etiologic (causal) factor and risk factor of development of disease. The determined and stochastic effects in organism under influence of environmental factors. Hygienic diagnostics. Ecological-dependent diseases.
3. Ways of realization of epidemiological method of health study. Forms and stages of epidemiological research of studying correlations in the system of environment-health.
4. Monitoring areas for assessment of environmental and health state, methodology of their selection. Methods of high quality and quantitative integral estimation of the environment state and health. Stages of integral estimation of the state of population health, information sources about health. Methods of establishment of high quality and quantitative correlations between the environment state and health. Prognostic estimations of health level depending on the state of contamination of atmospheric air, water, soil.
5. Conception about risk and its generalizing classification in health protection system. The main definitions of risk assessment methodology (source of hazard, exposure, dose, a reference or tolerant dose, relative, attributive, attributive population risk). Conception about biological markers (biomarkers of exposure, effect, susceptibility).
6. The main stages of risk assessment, their purpose and tasks. Schemes of epidemiological researches, suitable for determine of cause-effect relations in system of environment-health, and risk quantity indicators at carrying out of these researches.
7. Object and tasks of prophylactic toxicology. Basic principles of the independent and complex hygienical standardization of xenobiotics. Stages of hygienical estimation of compounds. Chart of toxicological experiment.
8. Basic parameters of toxicometry. Determination of concepts is toxicness, accumulation (after B.M. Shtabskiy), types of accumulation. Classification of industrial pollutants and pesticides after the degree of toxicness and danger.
9. Determination of concepts, hygienical value, method of ground of MAC of xenobiotics in air, water, soil, food products, ADD of pollutants in food rations and ADD of pesticides. Critical indicator of harmfulness at the hygienical standardization of xenobiotics in water, soil, food products.
10. Combined, complex and joint action of factors of environment, types of combined action.

### Control tests:

1. Two groups of investigated persons are formed for studying of emissions influence of the industrial enterprise on the population health: the persons of first group live away till 1 km from the enterprise in the conditions of polluted atmospheric air with maximum concentration limits excess in 3-4 times, the persons of second group live away over 5 km from the enterprise in rather pure area, the levels of emissions components in atmosphere in this part of city were below maximum concentration limits. To indicate the type of this epidemiological research.
  - a) the transversal retrospective type; b) the transversal prospective type; c) the longitudinal parallel type; d) longitudinal non-parallel type; e) the transversal parallel type.
2. Two groups of investigated persons (with disease and healthy persons) are formed for studying of smoking influence on development of chronic bronchitis. The investigated persons were interrogated about availability of this bad habit. To indicate the type of this epidemiological research.
  - a) the transversal retrospective type; b) the transversal prospective type; c) the longitudinal parallel

type; d) longitudinal non-parallel type; e) the transversal parallel type.

3. After Chernobyl atomic power plant failure during 1987-1990 years dynamic supervision over a radiation background and primary morbidity on thyroid gland pathology among children in Kiev is carried out. To indicate the type of this epidemiological research.

a) the transversal retrospective type; b) the transversal prospective type; c) the longitudinal parallel type; d) longitudinal non-parallel type; e) the longitudinal prospective type.

4. In 2010 by means of archival materials studying of prevalence of thyroid gland pathology among children in Kiev during 1980-1985 and 1987-1999 years is carried out. To indicate the type of this epidemiological research.

a) the transversal retrospective type; b) the transversal prospective type; c) the longitudinal parallel type; d) longitudinal non-parallel type; e) the longitudinal prospective type.

5. Two groups of investigated persons (with disease and healthy persons) are formed for identification of risk of chronic bronchitis occurrence depending on the duration and frequency of smoking. The quantity of persons who smoke, the duration and frequency of smoking is defined in each of groups by means of interrogation. What scheme of epidemiological research is the most expedient for revealing of relation between development of chronic bronchitis and duration and frequency of smoking?

a) the longitudinal prospective type; b) the longitudinal retrospective type; c) the transversal non-parallel type; d) the longitudinal non-parallel type; e) the transversal retrospective type.

6. Epidemiological research by the scheme "case-control" is applied to identification:

a) relative risk of disease occurrence; b) attributive risk; c) attributive population risk; d) the relation of chances of certain pathology occurrence; e) absolute risk.

7. In 1995 two groups of persons are formed: sick on fluorosis and healthy children, for the purpose of studying of the reasons of fluorosis occurrence among children of Sosnivka. Considering, that in this settlement water supply is decentralized, by results of laboratory researches of the content of fluorine in water of individual wells carrying out in regional sanitary and epidemiological station in previous years in each group have defined quantity of children who consumed water with the excess fluorine content. To indicate the type of this epidemiological research.

a) the longitudinal prospective type; b) the longitudinal retrospective type; c) the type of "case-control"; d) the longitudinal parallel type; e) the transversal prospective type.

8. Two groups of newborn children are formed: children of the first group lives away till 1 km from the industrial enterprise – a source of atmospheric air pollution are the subject to influence of emissions in concentration of 3-4 maximum concentration limits; children of the second group who lives away over 5 km, doesn't exposure of emissions influence. During dynamic supervision over physical development of these children over a period of year is established, that in corresponding terms of supervision in the first group quantity of children with physical backwardness were at 2-3 times more, in the second group – in 1,5-2 times less, than children with normal rates of development. To indicate the type of this epidemiological research.

a) the longitudinal prospective type; b) the longitudinal retrospective type; c) the type of "case-control"; d) the longitudinal parallel type; e) the transversal retrospective type.

9. The research is carried out for the comparison of relapses frequency of a stomach ulcer in control group of patients who in remission received by placebo the preventive therapy and in group of patients who in the same period received preventive therapy. In the end of research the relapses of stomach ulcer were observed in 30 % of patients of control group and in 5 % of patients which received preventive therapy. The relative risk of relapse of a stomach ulcer is:

a) 0,17; b) 0,6; c) 1; d) 6; e) 60.

10. The criteria of reliability of relation between influence of environmental factors and disturbance of health are all stated below criteria except of:

a) non-observance of hygienic standards; b) force of statistical relation between the factor



which is studied, and changes in health; c) specificity of relation; d) presence of dependence an exposure-effect; e) biological plausibility of relation.

11. What parameter of toxicometry is determined in acute laboratory experiment?

a)  $DL_{50}$ ; b)  $Cc$ ; c)  $Z_{b,ef}$ ; d)  $Lim_{ch}$ ; e)  $I_s$ .

12. The coefficient of accumulation of matter is 7 (after Yu.S.Kagan). What is the degree of toxicity matter?

a) emergency; b) potent; c) moderate; d) slight; e) nontoxic.

13) The median lethal dose of pesticide is 100 mg/kg. Evaluate matter according to the pesticides classification.

a) the severely toxic substance; b) the highly toxic substance; c) the moderately toxic substance; d) the minimally toxic substance; e) the nontoxic substance.

14. Combined action is the simultaneous action is:

a) noise and lead; b) noise and vibration; c) some substances; which penetrate into organism only peroral; d) some substances; which penetrate into organism only percutaneous; e) substances, which have ability to functional accumulation.

15. A substance is singly entered laboratory animals in mortal doses. An experimenter looked after death of animals on the first day of experiment. This experience is conducted with the purpose of determination:

a)  $DL_{50}$ ; b)  $Lim_{ac\ sp}$ ; c)  $Lim_{ch}$ ; d)  $I_C$ ; e)  $Cc$ .

16.  $DL_{50}$  of substance at enteral introduction by white rats is 390 mg/kg,  $Zac$  – 28 mg/kg.

What group of substances does a matter belong to after the degree of toxicness and danger?

a) I; b) II; c) III; d) IV; e) V.

17.  $DL_{50}$  of substance at enteral introduction makes for white rats 165 mg/kg, white mice – 51 mg/kg, guinea pigs – 90 mg/kg. This substance must be attributed to the substances which species differences are in:

a) absent; b) not expressed; c) expressed; d) acute expressed; e) extraordinarily expressed.

18. Laboratory testing of the drinking water sample showed the following results: lead is 0,06 mg/dm<sup>3</sup>, (MAC of 0,03 mg/dm<sup>3</sup>), cadmium is 0,003 mg/dm<sup>3</sup> (MAC of 0,003 mg/dm<sup>3</sup>). Expect the value of effect of combined action of substances and specify a right answer.

A. 0,3; B. 0,5; C. 1,0; D. 1,5; E. 3.

19. A 12 year old child (weight 30 kg) receives with his daily nutrition 180 mg of nitrates. Determine what daily dose of nitrates this child receives in fact?

a) 2,0 mg/kg of body weight; b) 4,0 mg/kg of body weight; c) 6,0 mg/kg of body weight; d) 10,0 mg/kg of body weight; e) 12,0 mg/kg of body weight.

20.  $DL_{50}$  of substances at their oral introduction make: first – 10 mg/kg, second – 15 mg/kg, third – 75 mg/kg; fourth – 120 mg/kg, fifth – 1000 mg/kg. What substance is characterized most toxicness?

a) V; b) IV; c) III; d) II; e) I.

### Control tasks

1. To make the list of health indices.

2. To draw up the scheme of basic principles and methods of hygienic diagnostics.

3. To draw up the scheme of signs and list of the known ecological-dependent diseases.

4. To make the chart of toxicological experiment, point out attention on the basic parameters of toxicometry.

### Practical employment

#### Preparatory stage (15%)

I. Statement of the educational purposes.

II. Control of initial level of knowledges, skills and abilities, base disciplines purchased at a study, and implementation of pre-class independent work.

### Basic stage (70%)

1. To draw up the program of epidemiological research from an exposure and estimation of correlation between environmental factors and population health, drawing special attention to the:

- a) selection of monitoring areas;
- b) integral assessment of hygienic situation in monitoring areas;
- c) selection of examination forms of epidemiological research;
- d) determination of information sources about health of the inspected contingents and of method of integral estimation of health;
- e) methods of estimation of cause-effect relations in the system of environment-health.

2. To master the method of epidemiological research of studying cause-effect relations in the system of environment-health by scheme “case-control”, according to the data of situational task to calculate the relation of chances of pathology occurrence and to estimate the received result.

*Task.* The city is provided by potable water from two water passages. The iodine content is 0,1-0,3 mg/l in the first water passage (F) and 2-3 mg/l in the second (S) one. The experimental group in number of 750 persons is formed by inhabitants who have diffuse nontoxic goiter of I-II degrees, 550 persons of this group use water from the passage S, 200 persons – from the passage F. The control group consists of 750 healthy inhabitants of this city who are the same age and sex with the people of experimental group. 250 persons of control group use water from the passage F and 500 persons – from passage S.

3. To master the method of cohort prospective and retrospective epidemiological research of studying cause-effect relations in the system of environment-health by scheme “case-control”, according to the data of situational task to calculate the absolute, relative, attributive, attributive population risk of pathology occurrence and to estimate the received result.

*Task 1.* Influence of hydrogen sulfide on death rate of workers from ischemic heart disease is studied in prospective epidemiological research. Researches were carried out over a period of 10 years on two cohorts. The experimental cohort consists of 343 men who worked at a factory of viscose fiber production and exposed by action of hydrogen sulfide not less than 5th years from the moment of the research beginning. The control group included 343 men who also worked in this city at wood pulp and paper mill factory and didn't expose by action of any chemical substances. Persons of the control cohort individually are select to persons of the main cohort by the age and character of carried out work. The habit to smoking, physical activity during the rest, physical endurance, tendency to corpulence, the lipids level in blood, tolerance to glucose, was carried out electrocardiography at physical activity were studied on the beginning of research for comparison of an initial health state of workers and possible influence of life way on health. As a result it's not revealed essential distinctions between experimental and control groups. The number of persons who died of ischemic heart disease during research was equaled 29 in experimental group and 11 in control one.

*Task 2.* The possible professional influence of organic solvents on development of Hodgkin's disease was studied in retrospective research. 25 persons with diagnosed Hodgkin's disease were included in experimental group. For each person of experimental group were selected 2 persons of control group who live in this city. Presence in the past the influence of organic solvents on persons of control group was detect by means of personal interviewing of all investigated for specially developed questionnaire that has allowed to define a professional route for each person from the moment of leaving school till the interview. If the interviewee testified to contact with any chemical substance, it was asked to name a kind of substance and character of contact to it (sporadic, repeated). Besides, researchers found out a hygienic situation at the corresponding enterprise. Exposed to action of substances is considered persons who daily contacted to organic solvent over a period of not less one year during the 10-year period of work. It was appeared 12 exposed persons

among 25 persons with Hodgkin's disease and 6 exposed persons among 50 healthy persons.

4. From data of situational tasks to estimate the parameters of toxicometry, give the hygienic estimation of industrial chemicals and pesticides after the degree of toxicity and accumulation.

*Task 1.* A median lethal dose of nitrate of lead is 3600 mg/kg,  $I_c = 0,29$ ,  $Tl_{50}(l) = 28,2$  h,  $C_c = 2,6$  (after Yu.S.Kagan). Additionally to define  $DL_{50}$  in a calculation on a metal.

*Task 2.*  $DL_{50}$  of pesticide (amidophos) at enteral introduction for white rats is 1080 mg/kg,  $C_c$  is 15,7 (after Yu.S.Kagan),  $Limch$  is 0,5 mg/kg. Additionally to define the zone of biological action and degree of accumulation of amidophos after its size.

*Task 3.* At daily enteral introduction to the white rats of single dose  $D_s = 1/10 DL_{50}$  (40 mg/kg) of pesticide N. the  $Tl_{50}(n)$  is 28 days. Additionally to calculate the coefficient of accumulation.

5. To make of principle charts of the independent hygienic standardization of chemicals in air, water of reservoirs, soil, food rations and separate foodstuffs, and also complex standardization of pesticides.

6. To ground from data of situational tasks MAC of xenobiotics in water and soil, defining the critical indicator of their harmfulness preliminary.

*Task 1.* As a result of the hygienic standardization of  $N,N,N',N'$ -tetramethylenediamine in water, to give hygienic estimation after the degree of toxicity and accumulation, to define the possible negative consequences on an organism at a receipt with water, critical indicator of harmfulness, to ground MAC of matter in water, to expect the species sensitivity coefficient.

Character of influence	Concentration, mg/dm <sup>3</sup>	Toxicity	mg/kg
Threshold concentration by perceptive criterion, t – 20 °C	20,2	Median lethal dose (white rats)	1050
Threshold concentration by perceptive criterion, t – 60 °C	10,0	Median lethal dose (white mouse)	1076
Threshold concentration by general sanitary criterion (biological oxygen demand stimulation)	0,5	Coefficient of accumulation	3,5
Ammoniacal nitrogen	1,0	Threshold dose by general toxic effect	5,44
Nitrate nitrogen	0,5	Maximum non-effective concentration by general toxic effect	0,68
Nitrite nitrogen	0,5	Threshold dose by allergenic effect	10,5
Saprophytic microflora development	5,0	Maximum non-effective concentration by allergenic effect	1,05
		Threshold dose by embryotoxic effect	10,5
		Maximum non-effective concentration by embryotoxic effect	1,05
		Cutaneous - resorptive effect	Absent
		Mutagenous effect	Absent

*Task 2.* In a toxicological laboratory the hygienic evaluation was conducted 5 new pesticides in soil (liquid forms of preparations). To calculate the species sensitivity coefficients, make a hygienic conclusion about the degree of toxicity of pesticides and ground their MAC.

Indication	Pesticide				
	1	2	3	4	5
Median lethal dose (white rats), mg/kg	45	2100	800	150	450
Median lethal dose (white mouse), mg/kg	42	2280	650	200	500
Coefficient of accumulation	5	6	3	2	0,5
Threshold concentration by perceptive criterion, mg/kg of soil	0,15	0,2	0,25	0,5	0,3

Threshold concentration by general sanitary criterion, mg/kg of soil	0,2	0,6	0,03	0,1	0,03
Threshold concentration by phytoaccumulation criterion, mg/kg of soil	0,01	0,35	0,4	0,02	0,018
Threshold concentration by migratory-aquatics criterion, mg/kg of soil	0,015	0,4	0,5	0,12	0,012
Threshold concentration by migratory-air criterion, mg/kg of soil	0,2	0,45	0,35	0,42	0,025
Threshold concentration by toxicological criterion, mg/kg of soil	0,05	0,3	0,4	0,025	0,02

7. To define from data of situational task of ADD and ADI of chemicals at entering in organism with day's ration of feed.

*Task.* Acceptable daily intake of lead with food, water and air for human (weight – 60 kg) is 0,21 mg according to FAO/HWO recommendation . MAC lead in atmosphere is 0,0003 mg/m<sup>3</sup>, MAC in water – 0,01 mg/L. Pulmonary ventilation volume is 20 m<sup>3</sup>/daily, daily necessity of water – 3L.

8. From data of situational task to estimate type of the combined action of chemicals after their intake with atmospheric air.

*Task.* Among child population in one of city district is registered increasing of respiratory diseases frequency, especially chronic bronchitis and bronchial asthma. According to laboratory result real concentration of chemicals (mg/m<sup>3</sup>) in atmosphere air are: sulphur oxide – 1,5 (MAC – 0,5), carbon oxide – 0,05 (MAC – 5,0), nitrite dioxide – 0,17 (MAC – 0,085), phenol – 0,01 (MAC – 0,01).

#### **Final stage (15 %)**

1. Control of level of mastering of professional abilities and skills.
2. Summation of class, home task.

### **TOPIC 2.**

#### **HYGIENE OF WATER AND WATER-SUPPLY, SANITARY PROTECTION OF WATER OBJECTS AND SOIL, CLEANING OF SETTLEMENTS.**

##### **Actuality of theme**

Quality of drinking-water is the important component of maintenance of health of man. Quality of drinking-water depends on the state of superficial and underground water sources and state of soils which at the terms of urbanization and industrialization test substantial anthropogenic pressure as a result of increase of volumes of liquid and solid domestic and industrial waste. Important pre-condition of the rational using and protection from contamination of water sources and soils, creation of the proper sanitary terms of life of population is cleaning of settlements from the liquid and solid waste of domestic and industrial origin.

##### **Learning aims**

To know the role of water and soil in forming of health of population, origin of infectious and uninfected pathology; sources of contamination of superficial reservoirs and soil; hygienical requirements to quality of drinking-water at the centralized and decentralizing water-supply, measures on the sanitary guard of soils; a value of superficial reservoirs and soil for cleaning of settlements from solid and liquid domestic and industrial waste.

Able to estimate quality of drinking-water, define the necessary methods of cleaning and disinfection of water of different sources of water-supply and estimate their efficiency; to find out the sources of contamination and develop measures on the sanitary protection of reservoirs and soil.

##### **Base knowledges, abilities and skills**

Hygienical and epidemiology value of water; methods of selection, transporting and conservation of tests, research of organoleptic properties of water, its sanitary chemical and sanitary bacteriological indexes; hygienical estimation of analysis of drinking-water; methods of cleaning (general and special) and disinfection of drinking-water; comparative hygienical description of

different types of chlorinating of water, hygienical value and method of determination remaining chlorine in a drinking-water; types of contamination of water sources, determination of character of contamination of water on microbiological and sanitary chemical indexes (dissolved oxygen, oxidation, BOD, nitrogen-bearings matters) [microbiology, general hygiene, epidemiology].

Hygienical and epidemiology value of soil; indexes of the sanitary state of soil; methods of selection, transporting and conservation of tests of soil, research mechanical composition and physical properties of soil, classification of soils on mechanical composition; ways of receipt of chemical matters from soil in an organism; cleaning of settlements from liquid and solid waste [microbiology, general hygiene, epidemiology].

### **Content of theme**

Hygienical indexes and norms of quality of drinking-water, them scientific ground. Determination of character and degree of contamination of water sources and ground of terms of its use for economic-drinkable necessities. Centralized and decentralize systems water supply, charts of water-supply line from superficial and underground sources. Cleaning and disinfection of water of water-supply line. Disinfection of sources of decentralizing water-supply. Areas of sanitary protecting of water sources.

Geochemical, geoenvironmental description of soils. Sources of contamination of soil in the conditions of industrialization and chemicalization of agriculture, influence of contamination of soil on a health and sanitary terms of life of population. A role of soil is in an origin and distribution of infectious diseases, invasions, diseases of uninfected etiology. Processes and indexes of autopurification of soil. An estimation of the sanitary state of soil according to chemical and biological indexes. Principles of cleaning of settlements. Liquid waste, their classification and sanitary-epidemiological value. Sewage system of settlements, its role in the prophylaxis of infectious diseases, influence on the sanitary state of soil and conditions of habitation of population. Cleaning of waste water and sanitary protection of reservoirs. Small sewage system and terms of its use. Features of utilization of solid and liquid waste of infectious, surgical and other departments of MPE.

### **Pre-class self-training work**

#### **Control questions**

1. Structure, composition and properties, hygienical value of hydrosphere, source of contamination.
2. Infectious and uninfected disease, related to the drinking-water, measures of their prophylaxis. Features of water epidemics. Water-nitrate methemoglobinemia, endemic fluorosis and caries, their prophylaxis. Hygienical value of hardness of water.
3. Hygienical requirements to quality of drinking-water and documents, that it was regulated.
4. Description of the centralized and decentralizing water systems. Elements of water-supply line from an artesian mining hole and superficial reservoir. General methods of water treatment at the centralized water (coagulation, precipitation, filtration) system, special methods of water quality improvement, methods of disinfection of water, their essence and hygienical characteristic. Areas of sanitary protection of water sources. Sanitary supervision after a local water-supply, organization and exploitation of wells, cleaning of wells.
5. Structure, composition, properties, hygienical value of lithosphere, source of contamination.
6. Infectious and uninfected diseases, related to soil, measures of prophylaxis.
7. Indexes of the sanitary state of soil, their classification and hygienical value. A reference scale of estimation of level of contamination of soil and degree of its hazard for the health of population.
8. Self-purification of soil, value for neutralization of domestic waste. Large and small sewage system, stages and methods of cleaning of domestic waste water.

9. Hygienical description of methods of collection, delete and neutralization of solid waste of domestic origin. Features of neutralization of neutralization and liquid waste of surgical, infectious and other departments.

**Control tasks**

1. To make the list of diseases, which can arise up under act of natural components of water and soil, matters, which are specially added to water, contaminants of water and soil.
2. To make the charts of water-supply from the superficial and underground sources.

**Practical employment**  
**Preparatory stage (15%)**

- I. Statement of the educational purposes.
- II. Control of initial level of knowledges, skills and abilities, base disciplines purchased at a study, and implementation of pre-class independent work.

**Basic stage (70%)**

1. To master substantive provisions SS 2.2.4-171-10 “Hygienical requirements to drinkable water, wich intended for a consumption a man”.

2. To estimate quality of water from data of situatioonal tasks, to define risk factors and them possible negative consequences for a health, to ground the measures of improvement of water quality.

*Task 1.* For the inhabitants of settlement K. it is discovered yellow-brown pigmentation enamel of teeth. The origins of these symptoms bind to the consumption of water from an artesian hole. Laboratory testing of water showed the following results: smell and taste are 2 points, colour – 30 degrees, turbidity - 1,0 nephelometric unit, hardness, – 5,5 mmol/dm<sup>3</sup>, iron – 1,0 mg/dm<sup>3</sup>, lead – 0,005 mg/dm<sup>3</sup>, fluorine – 2,5 mg/dm<sup>3</sup>, nitrates – 40,0 mg/dm<sup>3</sup>, total microbial number – 50 CFU/ml, E-coli – 1 CFU/100ml. Additionally to expect the real intake of fluorine in human organism at the day's water necessity 3 l, to compare the got results to day's requirement of fluorine.

*Task 2.* For water supply town N. is used river C. After spring flood the sanitary doctor researched water quality from river. Laboratory testing showed the following results: smell and taste – 2 points, color – 40 degrees, turbidity – 5,5 nephelometric units, nitrates – 15 mg/dm<sup>3</sup>, nitrites – 1,5 mg/dm<sup>3</sup>, ammonium – 1,5 mg/dm<sup>3</sup>, total microbial number – 300 CFU/ml, index of BGKP – 15 CFU/dm<sup>3</sup>, oxidation – 12 mg/dm<sup>3</sup>, residual free chorine – 0,1 mg/dm<sup>3</sup>.

*Task 3.* For water supply town A. is panning to take water from river, into which fall wastewater from industry factory. Concentration of chemical substances in water samples are: iron 1,0 mg/dm<sup>3</sup> (III class, MAC – 0,3 mg/dm<sup>3</sup>), cadmium – 0,002 mg/dm<sup>3</sup> (II class, MAC – 0,001 mg/dm<sup>3</sup>), arsenic – 0,1 mg/dm<sup>3</sup> (II class, MAC – 0,05 mg/dm<sup>3</sup>), lead – 0,06 mg/dm<sup>3</sup> (II class, MAC – 0,03 mg/dm<sup>3</sup>). Additionally to define the type of the combined action of xenobiotics.

3. According to data of situatioonal task to estimate the sanitary state of soil, define risk factors and them probable negative consequences for a health, develop measures on the sanitary protection of soil, to define possibility of the use of lot land for building.

*Task.* For building of hospital a few lot lands are offered in a microregion. A sanitary-hygenic laboratory analyzed soil from these areas, the results of which are presented in a table.

Indicator	Area	1	2	3	4	5	6	7
Coli-titer		0,0009	0,2	0,001	0,06	0,001	0,06	1,0
Anaerobe titer		0,001	0,15	0,001	0,04	0,001	0,04	0,3
Number of eggs of helminths/kg		80	0	120	20	75	20	1
Number of larvae and chrysalides of flies on 0,25 m <sup>2</sup>		8	0	14	2	8	5	0

Sanitary number of Khlebnicoff	0,75	0,98	0,9	0,9	0,9	0,9	0,99
Thermoophile titer	0,000013	0,01	0,00001	0,001	0,00001	0,01	0,003
Pollutional index ECS exceeding factor of MAC	3	7	10	1	1	0,5	0,5
Radiation safety index – soil activity	NL*	Exceeding by 1.5 times NL	NL	Exceeding by 2.5 times NL	NL	Exceeding by 1.5 times NL	NL

\* NL – natural level.

4. To propose the chart of utilization of solid and liquid waste:

- a) surgical, infectious departments of hospital in settlement which is provided with sewerage system;
- б) infectious department of hospital in settlement without sewerage system.

#### **Final stage (15 %)**

1. Control of level of mastering of professional abilities and skills.
2. Summation of class, home task.

### **TOPIC 3.**

#### ***HYGIENICAL ASPECTS OF PLANNING AND EXPLOITATION, PROPHYLAXIS OF IN-HOSPITAL INFECTION, ULTRAVIOLET IRRADIATION AND RADIATION SAFETY IN TREATING-AND-PROPHYLACTIC ESTABLISHMENTS.***

##### **Actuality of theme**

Successful decision of basic tasks of hygiene of treating-and-prophylactic establishments (TPE), which are directed on creation of the proper terms of stay of patients and labour of medical personnel, increase of efficiency of medical process, and warning of cases of in-hospital infections, impossible without the observance of hygienical requirements on the stages of planning and building of new and reconstruction of operating TPE, and also providing of the sanitary-hygenic and antiepidemic redimene of TPE. Responsibility for the observance of hygienical requirements on the stage of planning and building of TPE depends not only upon planners, institutions of state sanitary-epidemiology supervision but also on the leaders of establishments of health protection, head doctors of TPE., on the stage of exploitation – on head doctors , their deputies, managers by separations and all of medical personnel of TPE.

A health protection is one of industries of the use of sources of ionizing radiation (SIR). From data of MHP of Ukraine more than 80% TPE have subsections, which apply ionizing radiatioon for radial diagnostics (X-ray examination, radiography, fluorography, computer tomography), radiologic diagnosis in, vivo and in vitro and so on. For their help 70-90% clinical diagnoses are set. However much application of ionizing radiation in medical practice can predetermine the additional irradiation of personnel and patients of TPE, promote the collective dose of irradiation of population and increase the risk of remote stochastic, and on occasion – deterministic effects. With the purpose of diminishing of negative influence of IR on a health at a professional and anprofessional contact with them the necessity of the detailed account of all doses of irradiations which a man can receive from different, in particular, medical SIR.

##### **Learning aims**

To know hygienical requirements to planning and building of lot land of TPE, internal planning and technique equipping (water-supply, sewage system, heating, ventilation, illumination) of different structural subdivisions of TPE; sources, ways and factors of transmission, reason, and consequences, measures of prophylaxis of in-hospital infections, requirements to the sanitary-hygenic and anmtiepidemic regimene of TPE, control methods after his observance, principles and

methods of application of ultraviolet irradiation for the increase of resistance of organism and cleaning of air and objects in TPE; high-quality and quantitative descriptions of IR from radionuclide sources, which are used in medical practice, radiation-hygienical regulations of radiation safety of personnel and patients of TPE, measures of antiradiation protection and monitoring of irradiation of personnel which contacts from IR.

Able to estimate after project materials planning of area of TPE, internal planning and sanitary equipping of different department; to organize and estimate the sanitary-hygenic and antiepidemic regime of TPE, estimate the risk of origin of in-hospital infections, develop measures on their prophylaxis, to conduct prophylactic ultraviolet radiation of patients, air and objects; to define and estimate got a personnel and patients of TPE of dose of IV, to estimate efficiency of stationary facilities of defence and individual dosimetric control, ground the measures of limitation of irradiation of patients and personnel.

### **Base knowledges, abilities and skills**

Bases of preventive sanitary supervision, its stages, method of reading of building drafts; systems of hospital building, the basic hygienical requirements to planning of hospital area, internal planning of somatic chamber departments, chamber sections and chambers, technique equipping (water-supply, sewage system, heating, ventilation, illumination) of TPE [general hygiene].

In-hospital infections, them hygienical value, sources of origin, mechanisms of transmission, ways of prophylaxis [general hygiene, epidemiology]; hygienical requirements are to the sanitary antiepidemic regime of TPE (sanitization of patients, cleaning-up, ventilation, airing, observance of rules of asepsis and antiseptics, sterilization, disinfection, personal hygiene of patients and personnel); hygienical value of ultraviolet radiation, him biogenic and abiogenic action, methods of research of intensity, concept, about erytemal and preventive doses of ultraviolet radiation, hygienical regulations of prophylaxis of UV-deficiency, UV-reradiation, applications of UV-radiation for cleaning of objects of environment [general hygiene].

Structure of matter, concept about radio-activity, types of nuclear transformations, basic law of radioactive-decay, classification and properties of ionizing radiation, quality and quantitative descriptions of radionuclides and photonic radiation, their co-operation, with a matter; methods and units of measures of doses and radio-activity; physical bases of radiation protection; biological - which are exposed to the rays; hygienical regulation of radiation influence on a man, groups of radiation and hygienical regulations; classification of sources of IR, them general radiation and hygienical description; principles and methods of calculation of protecting are from IR [physics, biology, radiation medicine, general hygiene].

### **Content of theme**

Basic legislative and normatively-methodical documents which regulate the terms of location and planning of MPE. Sanitary-hygenic requirements to planning of lot land of MPE, therapeutic, surgical, pediatric, obstetric, infectious, admitting departments, operating block and polyclinic. Estimation after situation and general plans of accordance to the hygienical norms of placing and zoning of territory of designed MPE. Estimation after the drafts of accordance to the hygienical norms of area, cubic capacity, sanitary improvement of hospital apartments. A problem of in-hospital infections in medicine, modern determinations of concept and position to reasons of distribution, structure of nosology forms of in-hospital infections. Principles and measures of prophylaxis of in-hospital infections in permanent establishments of different type. Facilities of protection of personnel of MPE from in-hospital infections. Bases of investigation of flare-up of in-hospital infections in MPE.

Diseases, related to the deficiency and surplus of UV-radiation. The use of natural and artificial UV-radiation for the primary and secondary prophylaxis of illnesses. Artificial sources of ultraviolet, them hygienical characteristic.

Sources of ionizing radiation, which used in medical practice, them quality and quantitative characteristics. Basic principles of radiation safety and their providing. Radiation safety and





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3. To chart the scheme of the radiation and hygienic regulations of radiation safety of personnel and patients in CI (regulations of first and second groups) and measures of antiradiation protection of people working with SIR.

**Practical employment**  
**Preparatory stage (15%)**

I. Statement of the educational purposes.

II. Control of initial level of knowledges, skills and abilities, base disciplines purchased at a study, and implementation of pre-class independent work.

**Basic stage (70%)**

1. To make from data of situational tasks hygienical conclusions about accordance to the hygienical requirements of location and planning of lot lands of MPE, to define the type of building of hospital.

*Task 1.* General plan of hospital (Fig. 1). A building percent is 16%, planting of greenery – 65%.

150 m

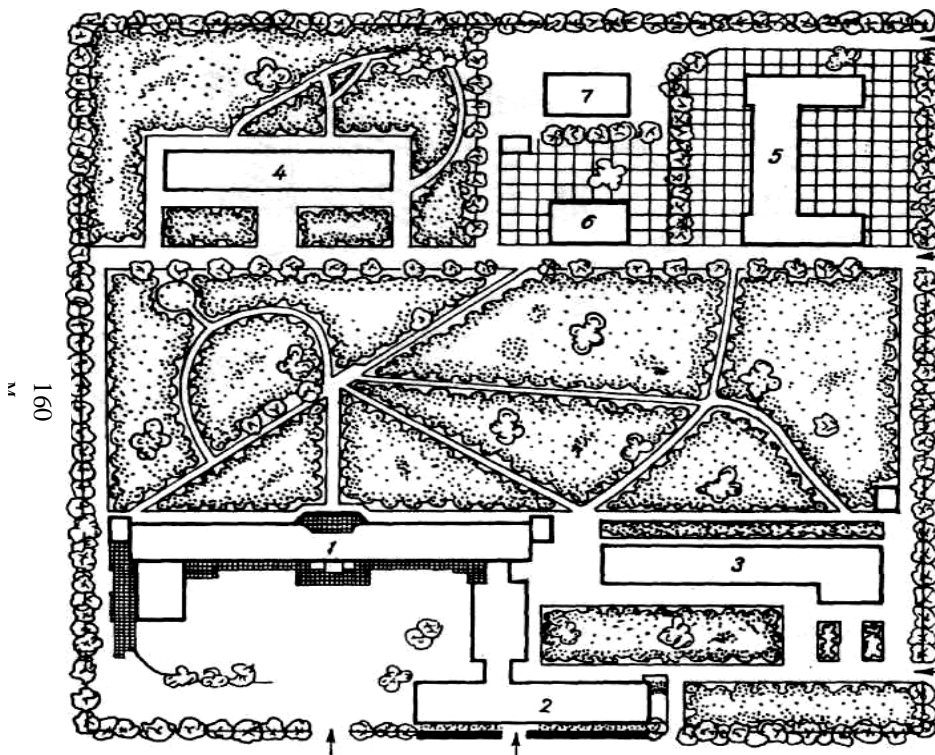


Fig. 1. General plan of hospital on 150 beds.

1 – main building (therapeutic and surgical departments) на 70 beds; 2 – out-patient clinic; 3 – obstetric-gynaecological building on 50 beds; 4 – an infectious building is on 30 beds; 5 – kitchen; 6 – economic building; 7 – morbid anatomical building.

2. To make the list of apartments, necessary in the obstetric-gynaecological separation of MPE, estimate the internal planning and technique of chamber section and infectious department after project materials.

*Task 1.* Plan of ward department on 60 beds (Fig. 2).

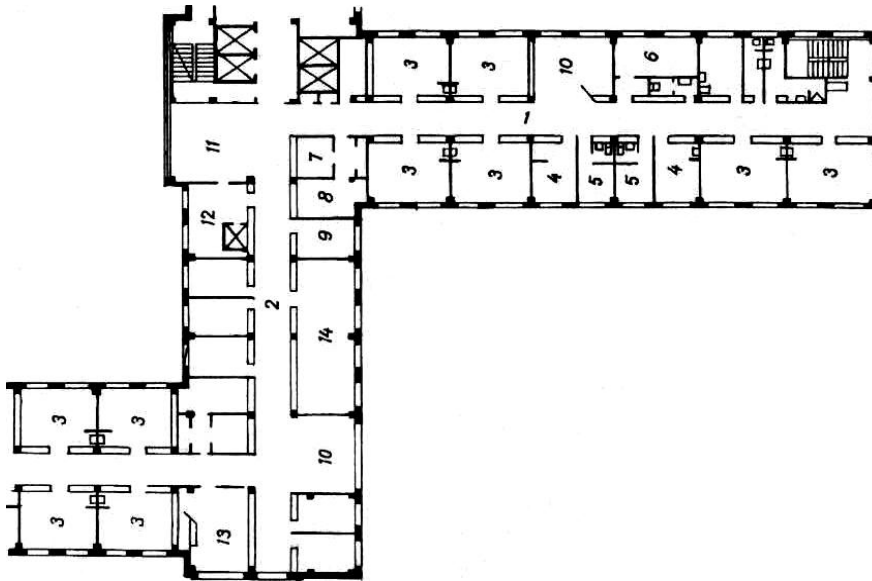


Fig. 2. A plan of ward section is on 60 beds.

1 – plan of ward section is on 30 beds; 2 – general apartments; 3 – 4-beds wards; 4 – 2-beds wards; 5 – 1-bed wards; 6 – medical treatment room; 7 – shower cubicle; 8 – bathroom; 9 – doctor's consulting room; 10 – entrance-hall for waiting; 11 – dining room; 12 – pantry; 13 – special care ward; 14 – technical room.

*Task 2.* Plan of infectious department (Fig. 3). Waste water of infectious department going to the separate storage, from where after the mechanical and biological cleaning are dropped in a reservoir.

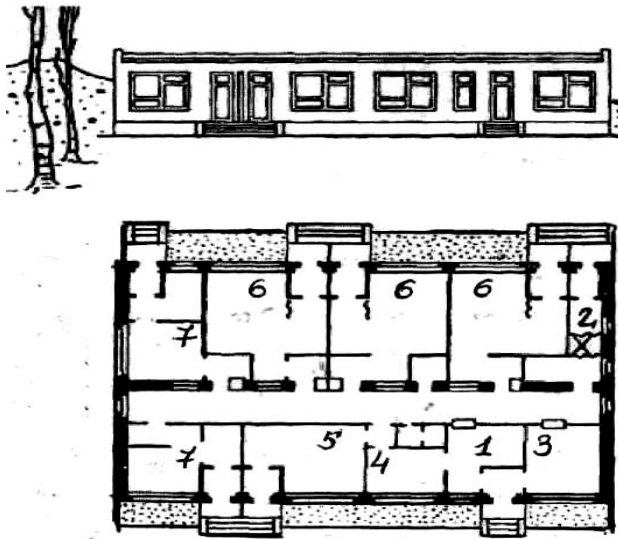


Fig. 3 Plan of infectious department on 8 beds

1 – entrance-hall for waiting; 2 – sanitary inspection room; 3 – pantry; 4 – doctor's consulting room; 5 – admitting box (area is  $17 \text{ m}^2$ ); 6 – 2-beds box (area is  $27 \text{ m}^2$ ); 7 – 1-bed box (area is  $20 \text{ m}^2$ ).

3. To define from data of situational tasks maintenance of microorganisms in air, efficiency of its cleaning, to estimate the sanitary-hygienic regime of wards and possibility of origin of in-hospital infections, ground prophylactic measures.

*Task 1.* Instrumental-laboratory research of air is conducted on bacteriological indexes (general microbial semination, *Staphylococcus aureus*) in a ward for new-born maternity department. Inoculation of air is conducted by sediment-aspiration method, sampling duration – 5 min, speed of aspiration of air is 20 l/min. After incubation in a thermostat 500 colonies, including 2 colonies – *Staphylococcus aureus*, grew on Petri dish.

*Task 2.* The trial air sanitation using the Krotov device had found 8000 microorganisms/ $\text{m}^3$  before and 3800 microorganisms/ $\text{m}^3$  after it. What is the exposure time for the sanitation of the air in the operating room using one LB-30 lamp.

*Task 3.* Humid cleaning of ward of purulent postoperative department carried out one time per days with application of a 1% solution of chloramine, ventilation to ward – four times per days,

change of linen – once for a week, and in the case of contamination its pus – immediately, patients accept a hygienical shower one time per a week.

4. To define from data of situational task tolerance dose rate of X-ray radiation of personnel and patients in the X-ray room and adjoining premises of care institutions, to estimate efficiency of the applied permanent defenders [1, P. 501-503], correctness of realization of individual dosimetry control and to define the dose of irradiation which personnel and patients are got.

*Task.* The X-ray examination complex (XEC) with full set of tripods is set in the treatment room of X-ray room of polyclinic, located on a ground floor at butt-end part of building. The initial beam of XEC are directed toward a butt-end main wall (distance from focus of XEC to the internal surface of wall is a 1 m, wall in a 40 cm thick from a brick by the density of a  $1,8 \text{ g/cm}^3$ ) after which in the distance a 50 m obstetrics department is located.

Control (panel) room for XEC is next to treatment room from a right side in the distance a 3 m. The control room is separated from the treatment room by a brick wall (a thickness is a 20 cm) with protective door (a thickness of steel sheet is a 15 mm) and with a survey window (a thickness of X-ray protective glass of TF 5 grade is a 10 mm). Therapeutic room is on the first floor above the treatment room in the distance a 4 m on a height, electric service panel is at basement floor in the distance a 4 m (the inserted floor is executed from concrete slabs in a 20 cm thick).

Individual dosimetry control of radiologists is carried out by means of thermoluminescent dosimeters which are attached to the lateral pocket of doctor's smock. One dosimeter is carried out control during 6 months. After an exposure dosimeters are withdrawn and accumulated in the premise of X-ray room, and at year-end are sent to the central laboratory of individual dosimetry and radiation safety of Institute of medical radiology (Kharkiv). Background and standby individual dosimeters are kept in the specially taken cabinet which is in the X-ray room. Individual annual doses of irradiation of personnel for the last year, are fixed in the accounting card of individual dose of irradiation of personnel and are hesitated within the limits of 10,5-12,0 mSv.

The patient with lung cancer has been undergone X-ray procedures during a calendar year. In the accounting card of the body burden of patient the value of total effective dose is registered at the level of 80 mSv per year.

5. To define from data of situational task absorbed dose rate in the air and equivalent dose got a personnel during contact  $\gamma$ -ray therapy in radiological department, to argue the necessary measures of antiradiation protection of personnel.

*Task.* 30 needles of cobalt-60 by activity of 740 kBq each will be use for interstitial radiotherapy of tumor in radiological department. Kerma for  $^{60}\text{Co}$  makes 84,23, medium energy of photons – 1,25 MeV. Needles will be keep in flask and procedural nurse will take them off by dressing forceps and will bring in to patients. Work distance at introduction will be a 0,5 m (length of forearm and dressing forceps).

#### **Final stage (15 %)**

1. Control of level of mastering of professional abilities and skills.
2. Summation of class, home task.

#### TOPIC 4.

### NUTRITION IN PREVENTIVE MEDICINE. THE TREATMENT-AND-PREVENTIVE AND ECOLOGICAL-AND-PROTECTIVE NUTRITION. THE SANITARY-AND-HYGIENIC CONTROL OVER A CLINICAL (DIETARY) NUTRITION.

#### **Actuality of theme**

*The rational nutrition* is physiologically full, balanced for all nutrients, qualitative and safe nutrition of the healthy human, which allow taking care and building up its health, raising the working capacity and longevity, preventing the alimentary (primary and secondary), alimentary caused, transalimentary and food intolerance diseases. The *preventive nutrition* is used for the purpose of preventing development of alimentary caused diseases in persons of risk group, the *treatment-and-preventive nutrition* (TPN) is used for workers of the industrial enterprises that to raise their resistance to influence of harmful production factors and prevent the occupational diseases. It's necessary to use the *ecological-and-protective nutrition* as powerful mean of protection of an internal environment of organism and raise the resistance to influence of xenobiotics for taking care and building up the population health in case of unfavorable ecological conditions.

*The clinical (dietary) nutrition* of sick human is the integral part of complex therapy and of the secondary and tertiary prevention of different diseases, which is intended for restore the homeostasis and activity of organism functional systems back to normal after diseases and must completely satisfy the requirements in nutrients and energy including features of metabolism and state of human organs and systems. This type of nutrition is used in medical-and-preventive and sanatorium-and-spa institutions and sanatoriums-preventoriums and attained by order of special compounded nutrient rations (diets), dietary habits and use of special methods of culinary processing of food.

#### **Learning aims**

To know the classification of the diseases of alimentary origin, principles and physiological-and-hygienic requirements to the organization of rational, preventive, treatment-and-preventive and ecological-protective nutrition; a biological role and basic sources of intaking the nutrients in human organism, treatment-and-preventive properties of foodstuff; principles of clinical (dietary) nutrition, numbered and elemental system of diets, standard diets and their characteristics, sanitary-and-hygienic requirements to nutrition units in care institutions, structure, staffs and duties of officials who organize of patient's nutrition in care institutions.

To be able to estimate nutrition adequacy of different population groups according to their physiological requirements of energy and the basic nutrients by means of indices of the nutritional status and data of menu schedule, to take control for the organization and adequacy of TPN, to prove the order of preventive and ecological-and-protective nutrition, to order and correct a clinical (dietary) nutrition, to control and estimate compliance of sanitary-and-hygienic requirements to work of hospital nutrition unit.

#### **Base knowledge, abilities and skills**

Physiology and biochemistry of digestion, metabolism and energy exchange, significance of proteins, fats, carbohydrates, vitamins and mineral substances for organism [biology, normal physiology, biochemistry]; nutrition peculiarities of pregnant women and nursing mothers [obstetrics]; nutriment functions, nutrition types; principles of the rational nutrition; the power expenses of an organism, components of daily energy expenditure, groups of physical activity of able-bodied population, concept about physical activity coefficient; physiological requirements for energy and nutrients of different groups of the Ukraine population; calculation methods of determination of daily energy expenditure and individual requirements of children, able-bodied and elderly age people in energy and the basic nutrients; calculation methods of individual and collective nutrition's qualities estimation by means of menu schedule; requirements to a dietary

habits; concept about the nutritional status of organism, methods of its studying and assessment; biological, nutritive and caloric value of the basic foodstuff of animal origin and phylogenous; basic groups of alimentary diseases; concept about TPN, its hygienic meaning, types, rations of TPN [general hygiene].

Features of metabolism and requirements to nutrition at various diseases and during treatment period; main principles of construction of clinical nutrition, numbered system of diets by Pevzner [internal diseases]; nutriciological characteristic of foodstuff; the organization of clinical (dietary) nutrition in care institutions, sanitary-and-hygienic requirements to planning, production equipment and the keeping of hospital nutrition unit, technology of food preparation, its transportation in hospital departments and distributions by the patients; preventive measures of food poisoning occurrence in care institutions; method of sanitary inspection of nutrition unit in hospital, sampling and assessment of adequate quality of dishes [general hygiene].

### **Content of lesson**

Nutrient functions and factors that they provide. Types of biological effect of nutrient and types of nutrition. Value of diets nutrient composition. The basic hygienic requirements to diet organization. Calculation of energy expenditure of organism, caloric and alimentary value of diets. Basic groups of diseases that expressly or by implication associated with nutrition, causes of their occurrence and prevention. The medical control for nutrition, methods of studying of actual nutrition of population. The nutritional status, methods of studying and assessment of caloric and vitaminized components of nutritional status.

Specific action of nutrient and rational nutrition, requirements to them. Health-improving action of nutrient and preventive nutrition of humans from risk groups. Hygienic principles of nutrition of pregnant women and nursing mothers. Value of TPN in prevention of occupational diseases. Protective function of nutrition. The basic mechanisms of intoxication, metabolism and detoxication of xenobiotics in organism. Main principles of construction and organization of TPN. The hygienic characteristic and assessment of a daily food product, chemical composition and caloric value of rations of a treatment-and-preventive nutrition. Ecological-and-protective nutrition, their principles and hygienic meaning.

Parapharmacological action of food. Principles of clinical nutrition. Alimentary nutrient value in clinical nutrition. Standard diets and their individualization. The list of the basic diets, the hygienic characteristic of their food-stuff, chemical composition and caloric value, methods of culinary processing of dish. Principles of the organization clinical (dietary) nutrition in hospitals and sanatorium-and-spa institutions. The sanitary-and-hygienic control by clinical (dietary) nutrition in care institutions.

### **Pre-class self-training work**

#### **Control questions**

1. Classification of alimentary diseases.
2. Nutrient functions and factors that they provide. Types of nutrient biological effect and types of nutrition. Functions of proteins, fats, carbohydrates, vitamins, mineral substances in nutrition. Components of daily energy expenditure of organism, methods of their determination.
3. Principles of rational nutrition. Groups of intensity of work of adult able-bodied population of Ukraine by physical activity coefficient. Requirements to dietary habits of the healthy human of able-bodied age.
4. Physiological requirements of children, able-bodied population, people of elderly age and senile age for proteins, fats, carbohydrates (for caloric of ration), vitamins and mineral substances.
5. Methods of studying of actual nutrition of population. Algorithm of daily ration assessment by means of menu schedule. The nutritional status, its components, types and criteria of assessment. Assessment of the nutritional status by means of body mass index.
6. Hygienic value and main principles of preventive nutrition.

7. Hygienic principles of nutrition of pregnant women and nursing mothers.
8. Hygienic value and main principles of TPN. Types and rations of TPN.
9. Principles of ecological-and-protective nutrition.

10. Principles of clinical nutrition in care institutions. Numbered system of diets and the indication to their order. Elemental (individual) system of clinical nutrition and its advantages, standart diets. Principles of the organization of clinical (dietary) nutrition in care institutions. Features of dietary nutrition in sanatoriums, preventoriums.

11. Structure and staffs, functional duties of officials in care institutions (the head doctor, the doctor on duty, the dietarian, dietary nurse, medical staff) and the list of basic documents in care institutions concerning of organization patient's nutrition. Order of passing of preventive medical surveys and inspections by personnel of nutrition unit in care institutions. Absolute and relative contraindications to work in nutrition unit.

12. The list of foodstuff and dish which are forbidden for receiving, preparation and realization by nutrition units in care institutions; foodstuff and dish which can leave to the next day in nutrition unit and in a still-room-distributing; the foodstuff which are forbidden for transfer by the patients from relatives. Means of preparation of the dietary dishes.

### Control tasks

1. To make the lists of alimentary diseases, functions, types of biological effect of nutriment and nutrition types, principles of rational nutrition, methods of population actual nutrition studying, algorithm of an daily nutrition assessment by means of menu schedule.

2. To prepare the abstract about one of nonconventional types of nutrition (a vegetarian nutrition, a nutrition of macrobiotic, nutrition by yoga doctrine, a separate nutrition, raw food diet, starvation, nutrition according to blood groups, by an ayurveda) or nutrition peculiarities of human of mental work; pregnant women, nursing mothers; people of elderly and senile age.

3. To make the list of rations of treatment and preventive nutrition.

4. To order a numbered diet to the patient with the indicating of dietary habits, chemical composition and caloric value of diet, the allowed and forbidden foodstuff, means of culinary processing of food.

Variant	1/7	2/8	3/9	4/10	5/11	6/12
Disease	Stomach ulcer in an exacerbation phase	Acute hepatitis	Chronic gastritis with hyposecretion	Myocardial infarction (the first 7 days)	Gout	Obesity
Diet						
Dietary habits						
Chemical composition of diet						
Caloric value of diet						
The allowed foodstuff						
The forbidden foodstuff						
Culinary processing of food						

5. To draw the algorithm of the organization of clinical nutrition in hospital, concentrating your attention on:

a) the procedure of order the clinical nutrition and maintenance of patients by it;

b) the organization of control over the quality of foodstuff and ready dishes;

c) the list of foodstuff and the dishes which are forbidden for receiving, preparation and realization by nutrition units in care institutions; foodstuff and dishes which can leave to the next day in a still-room-distributing; the foodstuff which are forbidden for transfer to the patients from relatives.

6. To take the algorithm of sanitary-and-hygienic inspection of nutrition unit in care institutions.

**Practical employment**  
**Preparatory stage (15%)**

I. Statement of the educational purposes.

II. Control of initial level of knowledges, skills and abilities, base disciplines purchased at a study, and implementation of pre-class independent work.

**Basic stage (70%)**

1. To estimate the adequacy of nutrition according to physiological requirements for adults and children, to define risk factors and their possible negative consequences for health, to argue measures concerning the nutrition rationalization by data of the situational task.

*Task 1.* The basal metabolism of 30 years old surgeon is 1700 kcal. Chemical composition of daily nutrition of the doctor are proteins – 80 g (70% of animals proteins), fats – 80 g (50% of plant fats), carbohydrates – 400 g, ascorbic acid – 50 mg, calcium – 1200 mg, phosphorus – 1200 mg, iron – 10 mg, ration's caloric – 2640 kcal. There is three meals a day with the next partition caloric value of daily ration: a breakfast – 20%, a dinner – 40%, a supper – 40%.

*Task 2.* During the studying of the actual nutrition of 20 years old student (girl) next parameters were revealed: caloric value of daily ration is 2600 kcal, proteins content – 72 g (animal proteins – 40 g), carbohydrates – 416 g, ascorbic acid – 70 mg, calcium – 1100 mg, phosphorus – 1200 mg, iron – 17 mg.

*Task 3.* During the studying of the actual nutrition of the 7 years old child next parameters were revealed: caloric value a daily ration is 2190 kcal, protein content – 65 g (animal proteins – 30 g), fats – 70 g (plant fats – 21 g), ascorbic acid – 30 mg, calcium – 1000 mg, phosphorus – 1000 mg, iron – 5 mg.

2. To estimate correctness of order the ration of treatment-and-preventive nutrition, accordance of set of daily food product, nutritional and caloric values of this ration to the hygienic requirements by data of the situational task [3, P. 273, 275-277].

*Task.* The ration N 4a is order for workers who make the luminous tube lamps. The set of daily food product presented in the table.

Products	Gross weight, g	Proteins, g	Fats, g	Carbohydrates, g	Ration caloric , kcal
Wheat bread	100	7,6	0,8	48,7	238
Macaroni	15	1,56	0,17	10,47	50,6
Carrots	10	0,13	0,01	0,84	3,4
Onions	5	0,07	–	0,49	2,05
Potato	300	6,0	1,2	51,9	240,0
Veal	50	9,85	1,0	–	48,5
Hake	30	4,98	0,66	–	25,8
Dairy butter	10	0,05	8,25	0,08	74,8
Vegetable oil	10	–	9,99	–	89,9
Animal fat	10	–	9,97	–	89,7
Tea	0,5	0,1	0,03	0,08	–
Sugar	25	–	–	24,95	94,75
Together	–	30	32	138	958

3. To make the list of principles of ecological-and-protective nutrition.

4. To estimate correctness of order of the diets presented in situational tasks, to make a comparative assessment of actual caloric and alimentary value of diets with their recommended composition and norms of physiological requirements for adult population in energy and the main nutrients, to define risk factors and their possible negative consequences for health, to argue recommendations concerning improvement of patient's nutrition, to modify diets.

*Task 1.* The diet N 1 is ordered to patient with acute hypersecretion gastritis in an



exacerbation phase (the first days of treatment). The salad from boiled vegetables and fresh white cabbage is included into menu of this diet. Chemical composition of a ration is: proteins – 80 g (including 40 g of animals proteins), fats – 90 g (including 25 g vegetative fats), carbohydrates – 300 g. Food is fivefold.

*Task 2.* Chronic hepatitis patient in a remission stage it is prescribed a diet N 5. The one-day menu of a diet: a breakfast – cottage cheese with sugar and sour cream, milk oatmeal porridge, tea; 2-nd breakfast – a baked apple; a dinner – a vegetarian soup with an oil, boiled rice and a boiled chicken, compote, from dried fruit, fresh white bread; a supper – boiled fish, mashed potatoes, tea with sugar, fresh white bread. Caloric value of ration is 2500 kcal, 13% of caloric value – at the expense of proteins, 27 % – at the expense of fats, 60 % – at the expense of carbohydrates. Vitamin C in ration is 40 mg.

*Task 3.* Adiposity patient it's prescribed a diet N 8. The one-day menu of a diet: a breakfast – a milk boiled buckwheat with butter, low-fat cottage cheese, tea, rich cookies; 2-nd breakfast – salad from a beet with an oil, rye bread, dairy butter, cheese, decoction of a dog rose without sugar; a dinner – vegetable soup with sour cream and a butter, a boiled carp with mashed potatoes on milk with butter, tea, rye bread; a afternoon snack – grated carrots with an oil, rusks from white bread, cocoa with milk; a supper – steam omelette on milk with a butter, rye bread, baked apples, low-fat kefir. Caloric value of ration is 2340 kcal, allocation to separate receptions of food is 477, 533, 586, 282, 462 kcal accordingly. The content of ration (g): proteins – 99, including animals protein – 54; fats – 84, including vegetative fats – 36; carbohydrates – 297; vitamins (mg): A – 0,4; B<sub>1</sub> – 1,7; B<sub>2</sub> – 2; C – 93; PP – 10; mineral substances (mg): Ca – 1210; P – 1766; Fe – 28; Mg – 491.

5. To estimate a sanitary state of nutrition unit of hospital, quality of ready food, correctness of actions of the doctor on duty concerning the control over work of nutrition unit and clinical nutrition order, to offer the measures for elimination of the positioned violations.

The doctor on duty of a night shift has visited the nutrition unit in the morning and has found, that free-flowing products are stored in pouches which are on cement floor; the meat demicarcass without a brand – in a cold storage box with the absent thermometer; butter in shape bar, turned in a newsprint, – on the one shelf with fish; water for a ware washing is warm up in buckets. The surface cutting block for meat is uneven, isn't strewed with salt. At the cook who prepares the food, the bandaged finger of the right arm; at survey – a wound with purulent scurf after a combustion. In nutrition unit there is absent week menu and certification magazine.

At quality check of a ready breakfast (a milk cooked semolina, tea, white bread with butter) the doctor on duty has noticed to the cook, that cooked semolina has grey-blue color and contains a significant amount of lumps of the welded up groats; portion pieces of appreciable slack-baked bread and undermixing traces; bread is light yellow color, a dense consistence, with inherent of bread scent and taste, on a section is glossy with evenly distributed drops of a moisture.

At night in hospital the pregnant woman with a nephropathy has entered. The doctor on duty has prescribed to her a diet N 7. The patient has protested clinic nutrition prescription, her motivating is that nutrition should be ordered by doctor-dietician.

### **The final stage (15%)**

1. Control of mastering level of professional abilities and skills.
2. Summation of class, home task.

## **TOPIC 5.**

### **LEGISLATIVE BASES OF THE MEDICAL AND PROPHYLACTIC PROVIDING OF WORKERS. HYGIENICAL ESTIMATION OF PROCESS OF LABOUR AND FACTORS OF INDUSTRIAL ENVIRONMENT.**

#### **Actuality of theme**

Providing of favourable working conditions and decline of morbidity among workers of industry and agriculture are one of the most important tasks of the public health system. The special medical institutions of ambulatory-policlinic type such as clinics, health protection posts are created on enterprises for providing of favourable working conditions. The work in these institutions is based on the shopfloor area principle which provides the everyday medical observing for all hands in concrete conditions of working environment. The shopfloor doctor-therapist heads the work on shopfloor area. The duties of shopfloor therapist include the skilled medical relief action for workpeople; participation in measures on making healthy of working conditions, prevention and decline of general and professional morbidity, productive traumatism, disability on a production, in particular participation in the study of working conditions and development of corresponding health measures; organization and realization of previous and periodic medical inspection; investigation of cases of professional diseases and poisonings; the work in medical commissions on the selection of persons, who require assigning of dietary or medical and preventive feed, sanatorium-resort treatment, transfer to another job with the facilitated conditions; realization of sanitary-educational work among workers; informing of sanitation and epidemiological service about all cases of resort of suffered from industrial accidents; analysis of efficiency of medical and health promotion programs. The estimation of process of labour and factors of occupational environment after the modern hygienical classification helps a workshop doctor to carry out objective control after the terms of labour on a industry, to find out reasons of decline of capacity, development of premature fatigue and overstrain, origin of proof functional violations, in an organism, occupational dependent pathology, professional diseases and poisonings of workers, to develop priority prophylactic measures.

#### **Learning aims**

To know the basis of Ukrainian legislation from hygiene and labour protection, basic tasks and forms of medical work in industrial enterprises, principles of organization and realization of previous and periodic medical inspections of working people, investigation of cases of professional diseases and poisonings, methodology of study and analysis of morbidity on production, complex measures of prophylaxis of diseases among working people; hygienical classification on the indexes of weight and tension of process of labour, harmfulness and unconcern of factors of industrial environment; functional changes in an organism in the process of manual and mental labour, measures of prophylaxis of premature fatigue, overstrain, occupational dependent pathology, professional diseases and poisonings.

To be able to make a plan of realization of periodic medical inspection on production, to make an urgent notification about recourse of suffered with reference on production accident and the report about professional disease (poisoning), to learn and analyze morbidity with a temporary disability, professional morbidity and disablement of workers, to work out the complex measures of prophylaxis of diseases among workers; to estimate character and terms of labour, define the class of labour after hygienical classification, degree of tension of physiology functions, risk factors and their possible negative consequences for the health of workers, to ground rationalizations of the modes of labour on concrete industries.

#### **Basics knowledge, abilities and skills**

A role and task of medical and sanitary clinics and working physicians in organization of sanitary and hygienic measures on industrial enterprises; scheme of hygienic inspection of enterprise, workshop, concrete profession; planned and unplanned inspections of enterprise by a shopfloor doctor and medical personnel of health protection posts; planning of medical and

preventive, sanitary and hygienic work on a shopfloor area [general hygiene]; accounting and analysis of morbidity of workers on industrial enterprises [general hygiene, social medicine]; professional diseases, their classification, list of professional diseases, structure of professional morbidity in Ukraine [occupational diseases], prophylaxis of professional diseases, poisonings and accidents [general hygiene]; aim and task of previous at starting work and periodic medical inspections of workers of certain categories, investigation of cases of acute and chronic professional diseases and poisonings on production [general hygiene, social medicine]. Indexes and methods of research of the functional state of the different systems of organism [normal physiology], physiology changes in an organism in the process of manual and mental labour, concept about a fatigue and overstrain; unfavourable influences of organization of workplace, working pose, modes of labour and rest, production microclimate, noise, vibration, electromagnetic radiations, illumination, dust and chemical admixtures, midair shop floors on the state of health of workings, methods of research and estimation of harmful and dangerous factors of industrial environment; ergonomics, physiology, psychophysiology indexes of weight and tension of labour, methods of their determination and estimation; [general hygiene]; professional diseases [professional illnesses]; hygienical classification on the indexes of harmfulness and unconcern of factors of occupational environment, weight and tension of labour process; hygienical requirements to organization of the modes of labour and rest, workplace, working pose, parameters of industrial environment; measures of prophylaxis of fatigue and overstrain, professional diseases, poisonings and accidents on industry [general hygiene].

#### **Content of theme**

Bases of Ukrainian legislation of occupational hygiene and labour protection. Bases of medical and prevention providing of working people, abide by sanitary norms and rules on enterprise and prophylaxis of professional diseases and poisonings. Groups of professional diseases. Measures of prophylaxis of professional pathology and labour protection on production. Previous and periodic inspections of workers, investigation of cases of acute and chronic professional diseases and poisonings, organization of their realization, accounting and current paper work. List of medical contra-indications to work with the harmful and dangerous factors of industrial environment and labour process. An order of establishing a connection between diseases and working conditions. Analysis of general, professional morbidity and disability of working people, indexes and methods of their determination. Accident prevention, productive sanitation, sanitary education of workers as measures of professional diseases and poisonings prophylaxis. Types of labour, their physiological and hygienic description. Manual labour, its weight, criteria of weight. Mental work, its tension, criteria of tension. Fatigue and overstrain, explanation and scientific grounds of their development. Modern principles and criteria of hygienical estimation of labour, classes of labour after the degree of weight and tension, harmfulness and unconcern. Methods of estimation of the modes of labour and rest, degree of tension of physiology functions of organism in the process of labour. The system of prophylactic measures and rational organization of labour process. Psychophysiology of professional selection, diagnostics and prophylaxis of mental overstrain.

#### **Pre-class self-training work**

##### **Control questions**

1. Sanitary legislation of labour protection. Prophylactic measures of occupational pathology and labour protection on production. Accident prevention, productive sanitation, sanitary education of workers as measures of occupational diseases and poisonings prophylaxis.
2. Previous and periodic medical inspections of workers, organization of their realization, accounting and current documentation. List of medical contra-indications to work with the harmful and dangerous factors of industrial environment and labour process.
3. Investigation of cases of acute and chronic occupational diseases and poisonings,

organization of this investigation, accounting and current documentation. Groups of occupational diseases.

4. Analysis of morbidity with a temporary disability and professional morbidity of working people, indexes and methods of their determination.

5. Types of labour and its physiological and hygienic description. Manual labour, its weight, criteria of estimation. Mental work, its tension, criteria of estimation. Features of operator labour.

6. Physiology and psychophysiology methods of research of the functional state of organism at mental and physical work. Physiology changes in organism of workers in the process of manual, mental and operator labour. Fatigue and overstrain explanation and scientific grounds of their development. Measures are on rationalization of the modes of labour and rest.

7. Harmful and dangerous terms of labour, criteria of their estimation. Classes of labour on the indexes of harmfulness and unconcern of factors of occupational environment, weight and tension of labour process.

8. Psychophysiology of professional selection, its purposes, tasks, methods.

#### **Control tests:**

1. The inhabitants of house appealed to district SES with a complaint in relation to negative influence on the state of health (worsening of feel, parahypnosis) of vibration, caused work of the underground railway located alongside. For confirmation of negative influence of factor on the state of health a doctor-hygienist must conduct instrumental research of levels of vibration with application:

a) dosimeter of vibration sensitiveness; b) noise and vibration dosimeter; c) pyranometer; d) actinometry; e) audiotester.

2. Influence of electromagnetic waves of range of radio frequencies can cause functional disorders of the different systems of organism. What systems are most sensible to the action of this radiation?

a) nervous and cardiovascular; b) cardiovascular and endocrine; c) nervous system and gastrointestinal; ) gastrointestinal and respiratory; e) cardiovascular and respiratory.

3. In connection with repair works on a transport highway motion of freight transport is carried out through housings microregions. It creates the vibrations of soil and constructions of houses. After character of influence this vibration belongs to :

a) general; b) local; c) impulsive; d) intermittent; e) monotonous.

4. A few sources of EMV, which work in different radio frequency ranges, function in a settlement. In this situation the level of EMV is determined recognition:

a) power of most source of EMV; b) power of the least source of EMV; c) to the effect of summation; d) to the effect of potentiation; e) to the effect of absorption.

5. The primary signs of unfavorable influence of communal noise on the human organism are:

a) intensifying of cardiovascular diseases; b) endocrine changes; c) psychophysiologic changes; d) pathological changes of hearing; e) intensifying of diseases of gastrointestinal diseases.

#### **Control tasks**

1. To make the list of basic tasks of medical and sanitary clinic and post of health protection on industrial enterprise.

2. To make the fundamental scheme of organization and realization of previous and periodic medical inspections of working people and list of medical contra-indications to work with the harmful and dangerous factors of industrial environment and labour process.

3. To make the algorithm of notification about accidents, their investigations and accounting, and also the algorithm of account, registration and investigation of chronic professional diseases and poisonings.

4. To make the scheme of studying of morbidity with a temporary disability, professional morbidity and disability on production, marking on it the information sources (basic official accounting documents), indexes of morbidity and disability, methods of their calculation.

**Practical class**  
**Preparatory stage (15%)**

I. Statement of the educational purposes.

II. Control of initial level of knowledges, skills and abilities, base disciplines purchased at a study, and implementation of pre-class independent work.

**Basic stage (70%)**

1. To make the plan of realization of periodic medical inspections of workers on enterprise for data of situational task.

*Task.* The medical inspection of 50 workers is planned on the enterprise from making of concrete constructions. The 30 workers work in a forming workshop. This workshop is equipped by vibration exciters – sources of noise and vibration, which exceed of maximum possible levels on 10-15 dBA and 5 dB accordingly. The 10 persons work in a concrete-mixing workshop which is equipped by 3-rd concrete-mixing plants – sources of dust. Content of silicon dioxide in dust hesitates from 50 to 70%. The 10 workers make a welding in reinforcing workshop. Such substances as dust, carbon monoxide, oxides of nitrogen and manganese are components of welding aerosol.

Plan of realization of periodic medical inspections

№	Workshop	Amount of inspected person	Amount of inspections during the year and their terms	Doctors-professionals	Laboratory and instrumental methods of testing

2. To give a previous diagnosis for data of situational task, to make an urgent notification about the acute professional poisoning.

*Task.* Patient named Ivanenko K.I. aged 43 years old, who lives in Lviv on Shevchenko street, building 158, flat 7 and works as a driver of tank lorry for transportation of petrol, resorts to the polyclinic of the Lviv oil-processing plant in 21.09.2010 with complaints about a headache, dizziness, nausea, vomit, palpitation, general weakness, easy twitching of extremities and eyelids muscles, psychic excitement, dryness in to the mouth, pain in eyes which appearance on the background of complete health during a hour after washing of tank lorry. Objectively: mucous membranes and cutaneous covering without changes, arterial pressure is a 80/60 mm of mercury column, pulse is 54 ictuses per minute, frequency of breathing is 16 per minute, heavy breathing in lungs, temperature of body is 35,6 °C, tones of heart are muffled, pupils are extended. Patient is quickly hospitalized to the department of occupational pathology in Lviv regional clinical hospital.

3. To define for data of situational task the adequacy of presented documents for the expert commission of medical and preventive establishment for establishing a connection between disease and working conditions, group of professional disease and its code after International Classification of Diseases, to make a notification about a professional disease (poisoning).

*Task.* The expert commission of occupational pathology department of Lviv regional clinical hospital on the basis of clinical researches taking into information, marked in a service record, medical report and medical conclusion of regional specialist from occupational pathology, admitted for a worker K. aged 47 years old, who works on coal-cleaning plant of trust “Ukrzahidvuhillya”, professional disease – chronic dust bronchitis.

4. To give a previous diagnosis for data of situational task, to give hygienic valuation, to determine factor of risk and possible negative effect for health, to propose hygienic measures.

*Task.* In blacksmith’s-press’s shop physical work connected with unfavourable

meteoconditions (air  $t^{\circ}$  - 40-50  $^{\circ}\text{C}$ , intensive infra-red radiation, humidity 25%, air movement velocity is 0,1 m/sec), one worker lost consciousness. Doctor of medical room testified the following: face pallor, wet skin, intensive perspiration, surface respiration with BR of 50/min, HR of 100/min, delicate filling, body  $t^{\circ}$  – 39,9  $^{\circ}\text{C}$ .

5. To estimate in what condition workers are in plant and what state of their thermoregulation system. What equipments were used for researches?

*Task.* Work conditions of workers in hotbed plant are characterized by the followings parameters of microclimate: temperature of air – 35  $^{\circ}\text{C}$ , relative humidity – 95 %, rate of air movement – 0,1 m/c.

6. Using the data in situational tasks calculate the concentration of dust in the air, make the hygienic evaluation of the conditions of work, estimate risk factors and possible consequences for the health, suggest prophylaxis measures.

*Task 1.* In the production of asbestos goods mixture of the asbestos with the cotton is used. This process is carried in special underground shelter with air-exhauster ventilation. During the reach of the air through the filter (time 10 minutes) with the speed of 20 litres per minute, filter mass increased on 2 mg. Laboratory examination of the qualitative content of the dust revealed 50% of the asbestos content.

*Task 2.* By the sanitary and hygienic laboratory research of dustiness of air of three areas of reinforced-concrete constructions plant is conducted. There determined the following:

Indication	Area	1	2	3
Speed of selection of test of air		20 l/min	20 l/min	20 l/min
Time of selection of test of air		20 min	10 min	30 min
Mass of filter before the selection of test of air		0,8 mg	0,8 mg	0,8 mg
Mass of filter after the selection of test of air		1,4 mg	1,8 mg	2,0 mg
Content of free $\text{SiO}_2$ in air		50 %	80 %	5 %
MAC, class of danger of dust		2 $\text{mg}/\text{m}^3$ , 4	1 $\text{mg}/\text{m}^3$ , 3	4 $\text{mg}/\text{m}^3$ , 4

7. To estimate for data of situational task morbidity with temporary disability of workers and office workers of enterprise, to work out the recommendations in relation to the decreasing of their morbidity.

**Morbidity with temporary disability  
among men and women for separate workshops and services**

Group of workshops	There are on 100 workers in each group of workshops			Average time of each case
	sick workers	cases	days	
<b>Men</b>				
Basic workshops	77,5	181,8	1628,3	
Additional workshops	74,5	170,4	1444,6	
Administration and logistic service	75,4	144,6	1573,7	
At the average on enterprise	76,0	175,3	1501,5	
<b>Women</b>				
Basic workshops	66,0	149,7	1325,4	
Additional workshops	64,7	126,9	1194,7	
Administration and logistic service	68,6	132,0	1350,9	
At the average on enterprise	66,0	140,3	1315,2	

8. To give the hygienic assessment of working conditions in the laboratory, to determine the risk factor and its possible negative effects on the health of workers, to argue the actions of optimization of working conditions in the laboratory, propose a technique of reducing the mercury levels in the laboratory rooms.

*Task.* The laboratory workers have complains on increased fatigue, weakness, drowsiness, timidity. An objective examination revealed small and frequent tremors fingers outstretched hands, in some workers - gingivitis. They use in laboratory devices with mercury filling. Mercury in the air ranged from 0.01 to 0.05 mg/ m<sup>3</sup> (MAC<sub>ev</sub> - 0.005 mg / m<sup>3</sup>, MAC<sub>max</sub> - 0.01 mg / m<sup>3</sup>), carbon monoxide - from 2 to 8 mg / m<sup>3</sup> (MAC - 20 mg / m<sup>3</sup>). The traces of mercury were found in walls and floor coverings. The mercury-filled devices installed on the tables, covered with vinyl plastic. The general ventilation facilities are present, local ventilation is not organized.

9. To estimate from data of situational task harmfulness and hazard of factors of industrial environment, weight and tension of labour process, their possible negative consequences for the health of workers; to define the class of labour after hygiene classification, to make the map of terms of labour; to estimate the degree of tension of physiology functions; to offer measures on rationalization of the modes and improving the terms of labour.

*Task.* The electrician works on the conveyer of collection of electronic measure devices in a sitting pose. She transfers from the ribbon of conveyer on a working surface (distance is 0,8 m) corps of device by mass 0,5 kg, executes 6 basic operations (fastening of 3th details in a corps, soldering of 3th contact wires), outlaying on them 40-45 sec, and a device returns on a conveyer. The electrician for the change processes 350 corps, executing to 30 thousand of stereotype workings motions with participation of muscles of hands and humeral belt. The size of the least objects of distinction (wires) is made by 1-0,3 mm at duration of the concentrated supervision more than 50% time; distance from eyes to the object – a not more than 0,5 m; time of active actions – 6,5 hours from 7-hour changes, half of an hour is occupied by dinner. Electrician work weekly in 1st and 2nd change. Middle energy requests of a fitter are 1120 kkal for a change.

Temperature of air is 22-23°C, relative humidity – 58-65%, rate of movement of air – 0,2-0,25 m/sec regardless of time of year. Soldering works are conducted an alloy which contains a 40% tin and 60% lead. Content of lead in mid air hesitates from 0,04 to 0,09 mg/m<sup>3</sup> (middle change MAC – 0,005 mg/m<sup>3</sup>, maximal once MAC – 0,01 mg/m<sup>3</sup>, 1st class of ununconcern), to hydrogen of chloride – from 1,5 to 3 mg/m<sup>3</sup> (maximal once MAC – 5 mg/m<sup>3</sup>, 2nd class of ununconcern, matter, with the acute mechanism of action). Sound-level in a workshop is – 85 dBA. Tension of the electric field of industrial frequency 50 Hertz during a change does not exceed 1 kV/m. Illumination of workplace is united, overhead – by luminescent lamps, lateral – through windows. The surface of workplace of light, corps of devices and wires, is black. The coefficient of natural illumination – 5%, at united – 3%. Artificial luminosity of workings surfaces at the combined illumination – 400 lk.

A middle latent period is outages visible agile made the reactions of fitters at the beginning of change of 150±10 ms, at the end of change – 210±18 ms, difficult – 175±12 and 250±25 ms; time of implementation of test for research of attention by the method of search of numbers at the beginning of change – 45±5 s, at the end of change – 65±8 s. At the beginning of change fitters memorized 4±1 from 6 geometrical figures, at the end of it – 2±1 from 6 figures. Middle change frequency of heart-throbs in fitters made 85±5 per minute; endurance to static effort which is 75% maximal force, at the beginning of change – 30±3 s, at the end of change – 18±2 s.

#### **Final stage (15 %)**

1. Control of level of mastering of professional abilities and skills.
2. Summation of class, home task.

## **TOPIC 6.**

### ***HYGIENICAL VALUE OF CONTAMINATION OF ATMOSPHERIC AIR AND PHYSICAL FACTORS IN SETTLEMENTS. HYGIENE OF PLANNING OF SETTLEMENTS.***

#### **Actuality of theme**

The enterprises of industry, transport and connection, cause contamination of atmospheric air, distribution of physical factors of technogenic origin (noise, vibration, electromagnetic fields), in settlements, that increases the physical and chemical loading on a population. The rational planning of territory of settlements observance of hygienical requirements to the chemical and physical factors in cities decreases pressure of the urbanized environment on a health, provides a physiology optimum, psychohygienic comfort and high level of capacity of man.

#### **Learning aims**

To know the sources and basic components of contamination of atmospheric air, their influence on a health; features of influence on the organism of physical factors of environment (to noise, vibration, EMV); measures of sanitary protection of air; hygienical principles of planning of settlements, functional zoning of their territory, hygienical requirements to planning and factors of internal environment of housings and public buildings.

To estimate the state of atmospheric air, to prognosticate influence of atmospheric contaminations on a health of population, to propose measures on the sanitary protection of atmospheric air; to estimate functional zoning of settlement, placement of industrial and communal objects, taking into account a windrose, parameters of internal environment of apartments of housings and public buildings; to conduct a hygienical estimation and develop the measures of primary and secondary prophylaxis of harmful influence of noise, vibration and EMV in the conditions of settlements, including in MPE.

#### **Basics knowledge, abilities and skills**

Chemical composition of atmospheric air, hygienical value of separate components; basic sources and components of contamination of atmospheric air, their influence on a health and sanitary domestic terms of life of population; methods of selection and research of chemical composition of air; windrose, its hygienical value; methods of determination and hygienical estimation of microclimate, natural and artificial illumination, indexes of anthropogenic and microbial contamination of air, efficiency of ventilation in the apartments of the different purpose [general hygiene, microbiology].

Anatomy and physiology of acoustic analyzer, mechanism of the auditory, pain, tactile sensibility [normal anatomy, normal physiology]; physical bases of acoustic vibrations, vibration, electromagnetic radiations, mechanism of their distribution; classification of noises on character of spectrum, frequency composition, sentinel descriptions; classification of vibration on the method of transmission, by spectrum character, frequency composition, timing data; classification of the electromagnetic fields on frequency and long waves [physics]; biological action and hygienical description of continuous and interrupted noise, general and local vibration, electromagnetic fields of different frequency ranges (tension of the electric and magnetic field, fluence energy), devices for their measuring [general hygiene].

#### **Content of theme**

Basic criteria and indexes of contamination of atmospheric air, air of living and public buildings. Influence of atmospheric contaminations on a health of population. An estimation of quality of atmospheric air and the method of study of influence of pollutants of atmosphere on a health. The system of prevention measures of contamination of atmosphere. Urbanization as socially hygienical problem. Terms of life in settlements and health of population. Diseases, caused the high tempos of urbanization. Principles of planning, functional zoning and building of settlement. Habitation as factor of forming of individual health. Basic hygienically factors of habitation, their hygienical estimation. Prophylaxis of diseases, conditioned the unfavorable



external and internal factors of human environment. Sources of noise, vibration, EMV in settlements, their hygienical value and standardization, system of measures on a decline and prevention of negative influence in housings, educational apartments, MPE. Legislatively normative documents, which regulate possible levels of noise, vibration, EMV in settlements.

### **Pre-class self-training work**

#### **Control questions**

1. Structure, composition and properties, hygienical value of atmosphere and its contamination. Description of sources of contamination of atmosphere in a settlement.
2. Mechanism of distribution of atmospheric contaminations and factors which the level of contamination of air depends on. Transformation of atmospheric contaminations.
3. Influence of contaminated air on a health and terms of residence of population. Acute and chronic poisonings, specific and nonspecific diseases, caused the action of contaminations.
4. Preventive measures of negative influence of contaminations of atmospheric air on a health. Sanitary-protection zones, their sizes for the enterprises of different classes of danger.
5. Methods of sampling air for sanitary-and-chemical and bacteriological research. There are expressmethods of determination of chemical admixtures in air.
6. Urbanization as socially hygienical problem. Terms of life in settlements and health of population. Principles of planning, functional zoning and building of settlement. Hygienical value of the green planting.
7. Hygienical value of microclimate, lighting and regime of insolation, chemical and microbial composition of air, efficiency of ventilation of housings and public buildings. State sanitary supervision after building of housings and public buildings, them by a sanitariums.
8. Sources of noise, vibration and EMV in settlements. Hygienical standardization of noise, vibration, EMV in the conditions of settlements. Measures of protection of population from noise, vibration, EMI of radio-waves.

#### **Control tests:**

1. The inhabitants of house appealed to district SES with a complaint in relation to negative influence on the state of health (worsening of feel, parahypnosis) of vibration, caused work of the underground railway located alongside. For confirmation of negative influence of factor on the state of health a doctor-hygienist must conduct instrumental research of levels of vibration with application:
  - a) dosimeter of vibration sensitiveness; b) noise and vibration dosimeter; c) pyranometer; d) actinometry; e) audiotester.
2. Influence of electromagnetic waves of range of radio frequencies can cause functional disorders of the different systems of organism. What systems are most sensible to the action of this radiation?
  - a) nervous and cardiovascular; b) cardiovascular and endocrine; c) nervous system and gastrointestinal; d) gastrointestinal and respiratory; e) cardiovascular and respiratory.
3. In connection with repair works on a transport highway motion of freight transport is carried out through housings microregions. It creates the vibrations of soil and constructions of houses. After character of influence this vibration belongs to :
  - a) general; b) local; c) impulsive; d) intermittent; e) monotonous.
4. A few sources of EMV, which work in different radio frequency ranges, function in a settlement. In this situation the level of EMV is determined recognition:
  - a) power of most source of EMV; b) power of the least source of EMV; c) to the effect of summation; d) to the effect of potentiation; e) to the effect of absorption.
5. The primary signs of unfavorable influence of communal noise on the human organism are:
  - a) intensifying of cardiovascular diseases; b) endocrine changes; c) psychophysiologic changes; d) pathological changes of hearing; e) intensifying of diseases of gastrointestinal diseases.

### Control tasks

1. To make the list of diseases this can arise under act of atmospheric air contamination.
2. To make the scheme of methods of research of parameters of microclimate, illumination and insolation, indexes of contamination of air, and rate of indoor ventilation.

Factor	A method of research, necessary devices or apparatus
Temperature of air	
Humidity of air	
Rate of movement of air	
Temperature of surfaces	
Intensity of infrared radiation	
Natural illumination	
Atrifical illumination	
Intensity and regimen of insolation	
Content of CO <sub>2</sub> in air	
Oxidability of air	
Microbal number of air	
Dust content in air	
rate of indoor of ventilation	

3. To make the scheme of sources of physical factors (noise, vibration, electromagnetic waves) in the conditions of settlements, them possible negative consequences for the health of population at the different levels of influence and measures of prophylaxis of negative influence

Factor	Sources	Negative influence on a health	Preventive measures
Noise			
Vibration			
Electromagnetic waves			

### Practical class

#### Preparatory stage (15%)

- I. Statement of the educational purposes.
- II. Control of initial level of knowledges, skills and abilities, base disciplines purchased at a study, and implementation of pre-class independent work.

#### Basic stage (70%)

1. To choose an area for building of hospital taking into account functional zoning of territory of settlement and windrose, to define the present factors of risk and them possible negative consequences for a health, to determine the size of sanitary protection zone for an enterprise and ground the basic hygienical requirements in relation to its organization.

*Task.* Building child's specialized sanatorium is planned in town K. By planning hygienical principles of functional zoning of territory are observed. In the industrial zone of city in the distance a 0,8 km from the projected area enterprise from processing of manganese ore of I-st class of dangeris located . Industrial, communally, external transport and green areas are located from the projected area south, southeast, the east and north, accordingly. Wind regimen of territory: N – 10%, NE – 10%, E – 15%, SE – 10%, S – 0%, SW – 10%, W – 15%, NW – 15%.

2. To give the hygienical estimation of maintenance of admixtures in the atmosphere air taking into account the effect of summation, to make a conclusion about the sanitary state of atmospheric air area, to define risk factors and them negative consequences are possible for a health, to ground measures, directed on cleaning of atmospheric air.

*Task.* Among child's population of city the increase of respirator diseases is registered, in

particular chronic bronchitis with an asthmatic component and bronchial asthma. In the distance 100 m from the limit of housing building are located industrial enterprise which belongs to II-nd class of danger. From data of laboratory of SES the maximally concentrations (mg/m<sup>3</sup>) of admixtures make in atmospheric air: sulfuric anhydride 1,5 (MAC – 0,5), carbon monoxide – 0,05 (MAC – 5,0), nitrogen dioxide – 0,17 (MAC – 0,085), phenol – 0,01 (MAC – 0,01).

3. To give the valence of right situation of chemical factory conserving to town, to determine dominate wind direction, to determine factor of risk and possible negative effect for health, to corrective sanitary-protection zone size.

*Task.* A town is situated in 400 m to the south from chemical factory (II class of harmfulness), which polluted atmospheric air by manganese. “Wind rose”: north – 10%, northeast – 10%, east – 5 %, southeast – 20%, south – 25%, southwest – 10%, west – 10%, northwest – 10%.

4. To estimate the state of air environment and light regimen of housing apartment from data of situational task.

*Task.* A content of CO<sub>2</sub> in air of housing apartment is 0,07%, general amount of microorganisms – 4000 in 1 m<sup>3</sup>, streptococci and staphylococci – 40 and 100 accordingly, the angle of incidence – 29., the aperture angle – 3., light coefficient – 1:7, KNI – 1,5%, coefficient of deepening – 1:2.

5. From data of situational tasks to estimate levels of noise, vibration and EMV on objects, define possible negative consequences for a health, to propose health measures.

*Task 1.* The acoustic mode in the cabinets of doctors of sanatorium, located in a resort area it was studied the laboratory of SES. The windows of cabinets go out on the pumping station which is located in the distance 10 m from a corps. The results of instrumental researches, conducted in daily time, are resulted in a table. Noise is permanent, wideband.

Octave-frequency band, Hz	63	125	250	500	1000	2000	4000	8000
Sound pressure level, dB	62	60	55	48	42	33	30	24

*Task 2.* A domestic doctor fixed the increase of cases of vegetovascular dystonia, hypertensive illness and functional violations of CNS for the inhabitants of a few houses on an area. As a result of instrumental researches the equivalent levels of inconstant noise are determine (table). A source of noise is a motor transport from a main street and lift equipment of house.

Apartment	1	2	3	4	5	6	7
Sound levels, dB A							
Transport noise	75	80	60	65	54	70	85
In-house noise	73	60	60	68	50	65	70

*Task 3.* At the periodic medical review of workers of polyclinics are registered increase of cases of neurasthenia and asthenovegetative syndrome. At the study of terms labours are set that medical workers on workplaces test influence of permanent vibration (table) duration of 25 min for most intensive 30 min supervision. The windows of cabinets go out on a railway which is located in the distance 20 m from establishment.

Octave-frequency band, Hz	2	4	8	16	31,5	63
Levels of vibration acceleration, dB	92	89	82	80	84	82

*Task 4.* The doctor of first-aid post of university fixed the increase of complaints about worsening of feel, decline of capacity, disorders of central, nervous and cardiovascular systems for the students of hostel. It is set at the study of terms of dwelling of students, that the meteorological radar station is located next to a hostel in the distance 100 m on a rise: range of waves – decimetric, a wave-length is 10,0±1,50 sm, time of irradiation with oneindex intensity – 10 h/day. Level of EMV on territory of housing building – 35 mcVt/sm<sup>2</sup>.

### Final stage (15 %)

1. Control of level of mastering of professional abilities and skills.
2. Summation of class, home task.

## **TOPIC 7.**

### **THE COMPLEX ESTIMATION OF INDIVIDUAL AND POPULATION HEALTH AND PHYSICAL DEVELOPMENT OF CHILDREN. HYGIENIC REQUIREMENTS TO PLANNING, IMPROVEMENT OF CHILDREN'S INSTITUTIONS AND THE ORGANIZATION OF TRAINING AND EDUCATIONAL PROCESS.**

#### **Actuality of theme**

Health of children is an integrated index which characterizes the influence of social-and-biological (heredity, pernicious habits of parents, pregnancy pathology), social-and-hygienic (educational and studying conditions, way of life) and medical-and-organizational factors on organism who has been grown and developed. The criteria of complex estimation of individual health of children are absence of chronic diseases, functional condition of the basic systems, organism resistance and level of development and its harmony. Population health of children is estimated by demographic indices, indices of morbidity, physical inability and physical development. The complex estimation of health state of children is a basis for improvement of the primary medical-and-preventive service for children's population, for elimination of the reasons and reduce of risk of infectious and not infectious pathology occurrence, including ecological-dependent pathology, for maintenance of organism resistance by means of hygienic education and training, for formation of skills of healthy way of life, for introduction the newest methods of biological prevention on preclinical stage of disease development.

Violation of hygienic conditions in preschool institutions and schools (disadvantages of zoning and planting, planning and sanitary-and-technical equipment, an air and temperature regimen, illumination), of organizations of day regimen (insufficient duration of sleep, walks on fresh air, excess duration of homework preparation, viewing of telecasts, insufficient physical activity), training and education (excess training load, the irrational timetable, mismatch of furniture to height of children) is the cause of disturbance of children's functional state, of different, in particular, school diseases in children that require the organization of timely medical-and-preventive measures by family doctors, school and district pediatrician doctors.

#### **Learning aims**

To know the features of adverse environmental factors influence on children's health, criteria of complex estimation of individual and population health, methods of research and estimation of children's physical development and criteria of health group distribution of children; features and negative consequences of influence of conditions of stay and studying on children's and adolescents' health in children's institutions, hygienic requirements to planning, sanitary-and-technical accomplishment and equipment of children's institutions, to organization of a day regimen, training and education, medical and psychophysiological criteria and methods of estimation of child's readiness for study.

To be able to estimation of physical development of individual and children's collective by complex methods, to distribute the children on health groups; to estimate planning of the ground area and premises of children's institutions, their air and temperature regimen and illumination, conformity of furniture to height, seating, a day regimen of children, training and education in a children's institution, readiness of children for study.

#### **Base knowledge, abilities and skills**

Concept about individual and population health, their criteria and the registration documentation, dynamics and tendencies of indices of children health in Ukraine and the world, methods of definition of intensive and extensive medical-and-statistic indices [social medicine]; anatomy-and-physiological features of different aged children, peculiarities of their growth and development, methods of morphological-and-functional indices research [biology, normal anatomy, physiology, propaedeutics of internal and children's diseases, general hygiene]; physical development as criterion of children health and the indicator of environmental state, research

methods of somatoscopic, somatometric, physiometric indices of physical development, definition of biological age, drawing up aged and sex standards of physical and biological development, an estimation of physical development for signal deviations from arithmetic mean, regression scales, complex method and centil method, estimation of probability of changes of physical development, health groups of children [general hygiene, pediatrics, social medicine, remedial exercises].

Hygienic requirements to planning and building of preschool institutions and schools; a hygienic estimation of school class (area, equipment, air and temperature regimen, illumination, methods of their research), school furniture (the size and groups of school desks, marking, locating), seating of pupils in class [general hygiene]; concept about a dynamic stereotype, physiologic bases of working capacity, methods of research of a functional state and working capacity of children and adolescents [normal physiology, general hygiene, pediatrics]; hygienic requirements to day regimen of child, training and educational process, timetable, lesson organization; concept about school maturity [general hygiene].

### **Content of the lesson**

The advanced social-and-biological, social-and-hygienic and medical-and-organization factors that influence on health of children, features of adverse factors influence on children. Modern methodical approaches to complex studying and estimation of state of children's health. The analysis of interrelation of indicators of health with influence of environmental factors: monitoring of environment and children's health state, an order and periodicity of complex medical examinations and dispensary supervision over a state of health of children. Physical development as the important criterion of complex estimation of children's health. Influence of environmental factors on processes of growth and development of children. An acceleration and retardation as opposite tendencies of physical development of children in modern conditions, their correlation with a state of health. Principles of distribution of children on health groups. A role of an estimation of health level at planning of preventive, medical-and-improving measures and at detection of their efficiency.

Peculiarities and negative consequences of influence on children's and adolescents' health of stay and studying conditions in schoolhouse. Hygienic requirements to the ground area, planning and a sanitary-and-technical accomplishment (water-supply, sewerage, illumination, ventilation, heating) of schoolhouse premises. Hygienic requirements to a construction and parameters of school furniture, maintenance of optimum position of a body behind a school desk. Method of estimation of a day regimen, training and education in schoolhouses. Preventive recommendations concerning improvement of sanitary-and-hygienic conditions of pupils' stay in the schoolhouse. Criteria of readiness of child to studying at school: morphogenetic (health status, physiological maturity, level of physical development, generated of small motility, biological age), psychological (intellectual, emotional-and-volitional readiness, motivational readiness), social (communicativeness, verbal activity, ect.)

### **Pre-class self-training work**

#### **Control questions**

1. The general peculiarities of growth and development of child.
2. Indicators, criteria and methods of a complex assessment of individual and population health of children. Physical development as the important criterion of a complex estimation of health of children. The basic indicators of physical development, methods of its research and estimation. Principles of health group distribution of children. Biological, social-and-hygienic and ecological factors (risk factors) that lead to infringements of children's health.
3. Modern concepts about an acceleration and retardation. Monitoring of health state of the children's population, its algorithm and the maintenance of each stage. Consequences, features and display of ecological-dependent infringements in children and measures of their hygienic correction.

4. Factors of pupils' stay and conditions of education in children's institutions, which can influence on children's and adolescents' health. Diseases caused by influence of environmental factors, of training and education in children's institutions.

5. Hygienic requirements to ground area of preschool institutions and schools, their functional zoning; requirements to planning, maintenance, equipment, microclimate, ventilations, illumination of the main premises of children's institutions. Principle of group isolation in preschool institutions.

6. Hygienic requirements to school furniture, groups of furniture, their marking, location in school class, rules of pupils' seating in class.

7. A school maturity, its criteria. Methods of definition of readiness of child to studying at school.

8. A day regimen. Hygienic requirements to elements of day regimen for children of different age.

9. Hygienic requirements to school timetable, method of its assessment.

10. Measures concerning improvement of sanitary-and-hygienic conditions of pupils' stay in modern schoolhouse.

### Control tasks

1. To estimate the physical development of boy by means of method of sigmal deviations and regional standards [1, P. 385, 388]; to construct the profile of physical development, to define biological age and health group of child by data of situational task.

*Task.* Deep medical examination of an 11-year old schoolboy was carried out. The following data were revealed: the boy has poor health (suffers from acute viral respiratory infections every month). His height is 133,5 cm, weight – 23,5 kg, chest circumference – 59,2 cm. His height has increased by 2 cm during previous year, the number of permanent teeth is 16, level of secondary sexual signs development is:  $P_0, A_{x0}$ . Pathological changes of internal organs aren't objectively detected. He takes physical training in the main group.

2. To calculate the frequency of diseases (prevalence and primary morbidity), prevalence of separate nosological forms, an index of health and morbidity structure by recourse of 0-14 years old children of city N. by data of the table.

Indicators	Variants						
	1/8	2/9	3/10	4/11	5/12	6/13	7/14
Average number of the children's population	20000	25000	27000	30000	35000	40000	50000
It's registered diseases, including:	30200	33750	36500	38000	45500	61000	65000
- infectious and parasitic diseases	600	650	750	900	910	1120	1170
- nervous diseases and diseases of sense organs	320	335	380	400	420	600	585
- respiratory diseases	18120	20111	22000	23000	25025	35000	37700
- diseases of gastrointestinal tract	3022	3320	3600	3400	5200	7000	7150
- other diseases	8138	9334	9770	10300	13945	17280	18395
It's registered at the first time current year	21140	21937	27375	24700	31850	41480	46800
Number of children that weren't ill during a year	1800	2750	2160	3000	4200	4404	6500

3. To calculate the general pathological morbidity and completeness of coverage by medical inspections of pupils of a comprehensive school by data of the table.

Indicators	Variants						
	1/8	2/9	3/10	4/11	5/12	6/13	7/14
Number of pupils at school	600	700	720	750	760	780	1115
Number of surveyed children	550	680	640	600	590	620	1003
It's revealed diseases, including:	380	450	480	460	440	490	650
- respiratory diseases	100	120	120	110	100	140	150
- diseases of gastrointestinal tract	120	150	140	130	120	150	180
- nervous diseases and diseases of sense organs	60	80	70	80	70	60	100
- chronic tonsillitis	80	90	80	90	80	70	60
- other diseases	20	10	70	50	70	70	160

4. To estimate the probability of infringements in physical development of 4-year-old children of Lviv during 10 years by data of the table.

Variant	Indicator					
	Height, M±m		Weight, M±m		Chest circumference, M±m	
	1999 year	2009 year	1999 year	2009 year	1999 year	2009 year
1/8	105,0±0,2	104,2±0,3	18,0±0,3	17,2±0,2	52,1±0,4	51,0±0,4
2/9	111,0±0,4	110,0±0,2	20,0±0,2	19,1±0,1	57,1±0,3	55,0±0,2
3/10	118,0±0,3	116,8±0,2	22,1±0,3	21,1±0,1	58,0±0,3	57,1±0,4
4/11	104,0±0,4	103,8±0,2	17,4±0,2	16,7±0,6	51,3±0,4	50,0±0,3
5/12	111,0±0,5	109,1±0,2	19,8±0,3	18,8±0,3	57,5±0,3	56,2±0,4
6/13	117,2±0,3	115,8±0,3	22,6±0,3	20,6±0,2	58,0±0,5	56,6±0,3
7/14	120,3±0,2	118,4±0,4	23,0±0,2	21,0±0,4	60,0±0,4	58,1±0,4

5. To estimate according to the situational task the fullness and area of study class room, its sanitary-and-technical accomplishment, location of school desks, their conformity to height and correctness of pupils' seating, to argue the hygienic recommendations.

*Task.* A study classroom of mathematics for 40 pupils has length of 8 m, width of 6 m, height of 3,2 m. 2 ventilation ducts, located in the upper part on the interior wall, and window vent sashes provide natural ventilation. Air exchange rate is 2 times per hour. 3 windows 2·1,5 m size each provide natural lighting, artificial illumination is provided by ninth 150 W incandescent lamps, which have directed-diffused lighting fixtures and are held 3 m above the floor.

20 two-place school desks with chairs are arranged in three rows: 7 school desks in side rows, 6 school desks and teacher's desk in middle row. There are school desks with height 64 cm and 70 cm, chairs with height 42 cm. Height of 6 pupils is in limens of 131-145 cm, 15 – 146-160 cm, 19 – 161-175 cm. One of pupils who has height of 170 cm and corrected myopia of middle degree sits at a penultimate school desk in middle row; second of pupils who has growth 168 cm and rheumatism with attenuation of activity rheumatic process – behind a penultimate school desk near a window, the third of pupils who has height of 172 cm and audition depression in a range of medium and high audio frequencies – behind a penultimate school desk at an interior wall of a class. Lowest pupil sitting in middle row at the school desks with differentia more than length of an elbow of down arm on 10 cm, depth of seat is equaled 2/3 of hip length height of seat on 6 cm is more than length of crus with foot.

### **Practical training** **Preparatory stage (15%)**

I. Formulation of learning aims.

II. Control of basic level of knowledge, skills and abilities, acquired by studying of base disciplines.

### **The basic stage (70%)**

1. To estimate of child's physical development by complex method, to determine the health group, factor of risk and its possible negative effects for health, to argue of preventive measures.

*Task.* The height of 12-year-old boy is 145 cm, his weight – 33 kg, chest circumference – 68 cm. According to this height standard parameters of weight is 38,5 kg and the one of chest circumference is 70,9 cm, sigma regress of weight is 4,5 and sigma regress of chest circumference is 3,8. Biological status corresponds to the age of boy. Functional parameters are within the borders of  $M \pm \sigma$  for this age. Hyperacidic gastritis in the compensation stage and hyperplasia of thyroid gland of the II stage were revealed during the examination.

2. To distribute the children on health groups, to calculate the percent of children in each groups, to argue preventive and medical-and-treatment measures by data of the situational task.

*Task.* The doctor of juvenile study during preparation of annual report generalized the results of children morbidity after the appeals and results of medical inspection examinations. The analysis of results of inspection of pupils of the IX class showed that: 5 children don't have the rejections in

the state of health; 2 children for a previous year were ill on acute respiratory disease one time; 5 children were ill acute respiratory infections twice; 3 children were ill acute respiratory infections five times; at 4-th children were found out a flat foot; 3 children are had surplus weight within the limits of 12-17%; at one child was found out obesity of a III degree; at one child myopia is set 3,5 D; at 3-rd children found out the teeth decay of high activity; at 2-nd children were found out hyperplasia of thyroid gland of 1st degree.

3. To draw the algorithm of monitoring of children's health state.

4. To draw the scheme of risk factors of the most widespread diseases at children/

5. To estimate internal and external planning of the children's institutions by the design stuffs resulted in situational tasks.

*Task 1.* Planner is presented the general (fig. 1) and floor (fig. 2) plans of preschool institutions for endorsement with sanitary inspector.

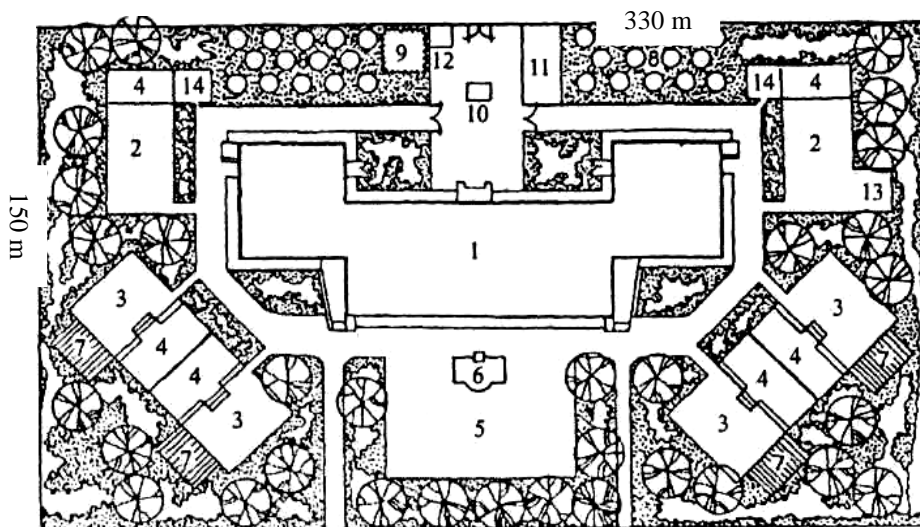


Fig. 1.

The general plan of preschool institutions on 140 places (6 groups).

1 – the house; 2 – the areola of little child group; 3 – the areola of preschool group; 4 – shadow cover; 5 – the sports areola; 6 – a fountain-reservoir; 7 – a garden-berry field; 8 – an orchard; 9 – a nature corner; 10 – an economical yard; 11 – a shed-ice; 12 – garbage recipients; 13 – the areola for feeding of children; 14 – a premise for storage of baby carriage

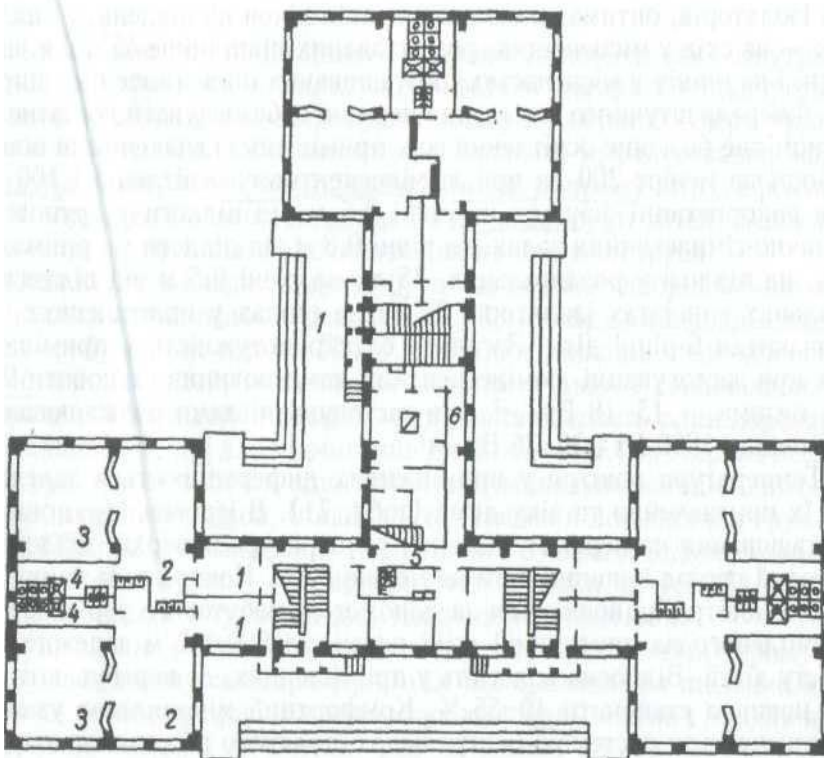


Fig. 2. The plan of the first floor of the house of a daycare centre: 1 – a locker room; 2 – a group room from still-room; 3 – a bedroom-veranda; 4 – water closet with shower cubicle; 5 – infirmary; 6 – nutrition unit.



Task 2. Planner is presented the general plan of school (fig. 3) for endorsement with sanitary inspector.

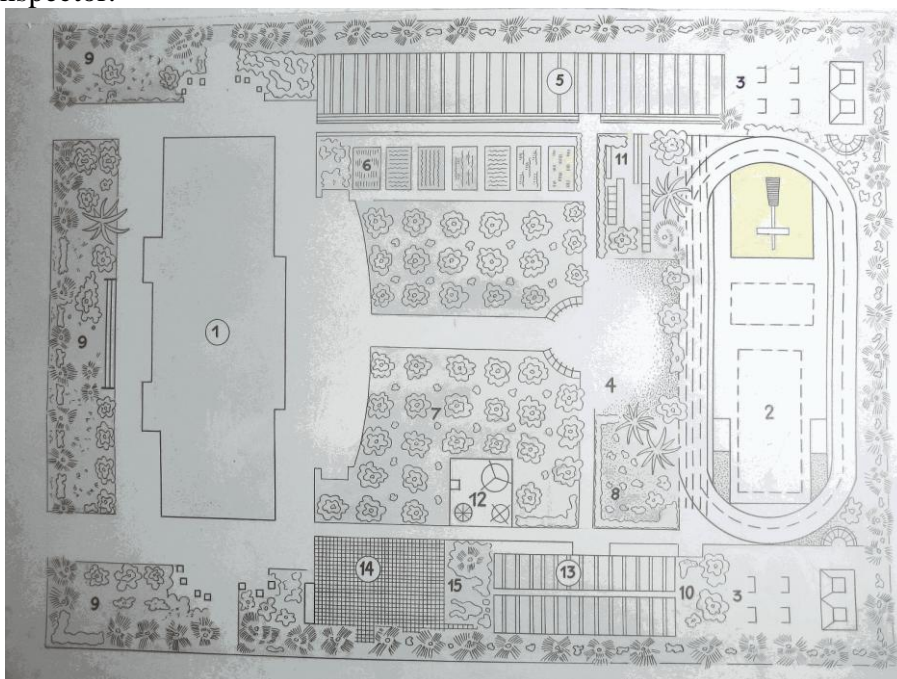


Fig. 3. The general plan of school on 320 pupils. 1 – the school house; 2 – sports region; 3 – the sport area; 4 – the area for active games of pupils of the first classes; 5 – the area of field cultures; 6 – fields of floral plants; 7 – an orchard; 8 – a field of adornment plants; 9 – a biological field; 10 – the geographical area; 11 – the meteorological area; 12 – physical training and sport zone initial classes; 13 – an economical zone; 14 – the zoological areola.

6. To estimate according to a situational task readiness of children to study at school.

Variant	Kern-Irasic test			Circle cutting, points	Memory, %			Verbal-and-logical thinking, points
	Drawing of men	Sequence of 10 points	Phrase from 3 words		mechanical	verbal-and-logical	picture	
1	2	1	1	1	88	80	90	16
2	2	2	1	1	80	80	85	14
3	1	2	1	1	90	90	80	18
4	3	3	4	2	65	68	70	10
5	3	4	4	2	45	48	40	5
6	4	5	5	3	35	30	38	2

Task. The readiness to study at school was carried out for children of the senior preschool group of kindergarten by means of Kern-Irasic test and the test of circle cutting (table).

7. To estimate according to a situational task the day regimen of the pupil and the organization of educational process at school, to define risk factors and their possible negative consequences for health, to argue the measures for rationalization of the day regimen and educational process.

Task. The pupil of 10th class of secondary school applies to the school doctor with the complaints to bad sleep, fatigue and headache. School doctor doesn't find any pathology during physical examination. It's established during interrogation that the pupil studies on the first session, also he is studying at mathematical hobby group once a week after lessons. His day regimen include: waking up – 7<sup>00</sup>, morning procedures – 7<sup>00</sup>-7<sup>30</sup>, breakfast – 7<sup>30</sup>-7<sup>50</sup>, homework – 7<sup>50</sup>-8<sup>50</sup>, way to school – 8<sup>50</sup>-9<sup>00</sup>, staying at school – 9<sup>00</sup>-14<sup>00</sup>, way from school to home – 14<sup>00</sup>-14<sup>10</sup>, dinner – 14<sup>10</sup>-14<sup>30</sup>, rest and help to parents – 14<sup>30</sup>-16<sup>00</sup>, homework – 16<sup>00</sup>-20<sup>00</sup>, supper – 20<sup>00</sup>-20<sup>20</sup>, viewing of telecasts – 20<sup>20</sup>-23<sup>45</sup>, evening procedures – 23<sup>45</sup>-24<sup>00</sup>, going to bed in 24<sup>00</sup>.

Pupil's studying load is 32 lessons per week, duration of lessons – 45 minutes, duration of break between lessons – 10 minutes, after the second lesson – 30 minutes. Timetable is resulted in the table:

Monday	Tuesday	Wednesday	Thursday	Friday
1. Literature (7)* 2. Algebra (11) 3. Geometry (11) 4. Biology (6) 5. Language(7) 6. Geography (6)	1. Chemistry (9) 2. Physics (9) 3. English (10) 4. Computer science (11) 5. History (8) 6. Foreign literature 7) 7. Physical training (5)	1. Language (7) 2. Geometry (11) 3. German (10) 4. Physics (9) 5. Algebra (11) 6. Literature. (7) 7. Physical training (5)	1. English (10) 2. Chemistry (9) 3. Algebra (11) 4. Computer science (11) 5. Geography (6) 6. Foreign literature (7)	1. Language (7) 2. German (10) 3. Chemistry (9) 4. Biology (6) 5. History (8) 6. Labour (4)

\* It's points by rank scale of subjects complexity by I.H.Sivkov.

### Final stage (15 %)

1. Control of level of mastering of professional abilities and skills.
2. Summation of class, home task.

### TOPIC 8.

#### THE ORGANIZATION OF SANITARY INSPECTION ON TEMPORARY PLACING, FEEDING AND WATER-SUPPLYING OF THE RESCUE UNITS AND POPULATION IN EMERGENCY SITUATIONS. THE FORMING OF RADIATION LOAD AND HYGIENIC ASPECTS OF RESIDENCE OF POPULATION ON TERRITORIES WHICH WERE EXPOSED TO THE RADIOACTIVE CONTAMINATION

#### Actuality of theme

The last decades are characterized by substantial increases of amount of emergencies of technical (transport failures, fires, explosions, in particular with the extras of poisonous and radioactive matters, failure, on the systems of life-support, hydro technical and cleansing buildings and others like that), natural (natural calamities of geological, hydrological and meteorological origin, natural fires and others like that) and socio-political character (armed attacks, captures and maintenances of objects, establishment of explosive devices, and others like that). During the liquidation of consequences of emergencies next to a leading under the direction of Ministry of emergency measures wrecking and organized government service of medicine of catastrophes medical evacuation measures by forces and facilities of state sanitary epidemiology services the complex of sanitary-hygienic and disease measures, directed on safety of the temporal placing, water-supply and feed of a victim of population and rescue units is carried out. The sanitary-hygienic providing of personnel in the rescue forming and population in emergencies is providing with different type short-time field placing, shelters, high quality meal and drinking-water, which belong to the ponderable factors of maintenance of health and capacity. Providing the rescuers and population by a valuable feed, of high quality food products and prepared meal is possible only by attentive control on the terms of supply, storage of products, preparation of meal, providing by the necessary amount of high quality drinking-water – by the correct choice of water sources, observance of hygienic requirements, to organization of water-supply, application of adequate methods of cleaning and water disinfection.

Forming of the radiation load of population takes place both as a result of irradiation by the industrial and medical sources of ionizing radiation and as a result of irradiation by the technogeneuous increased radiation sources. The substantial increase of the radiation load of Ukrainian population was entailed by the powerful emissions of radionuclides in an atmosphere during a failure on the Chornobyl nuclear power plant (CNPP), which resulted in contamination of soils, superficial basins, groundwater, agricultural lands on considerable territory of country and substantially promoted the risk of development of long-term stochastic effects at a population. Consequently, organization and realization of complex of sanitary and hygienic measures, directed at decreasing of the radiation load of population of Ukraine from the different sources of ionizing radiation, have been remained topical during many decades.

### **Learning aims**

To know classification of emergency situations, their influence, on the sanitary-hygienic terms of dwelling of population and labour conditions of the rescue units, basic principles of organizations of the sanitary-hygienic and disease providing, temporal placing, feeding and water-supply of a victim of population and rescuers, during emergency, principles of prognostication of medical hygienic consequences of emergencies; sources and regularities of forming of the radiation load of population, hygienic regulations of radiation safety of environmental objects and ways of their achievement, hygienic regulations of residence of population on territories which were exposed to the radioactive contamination as a result of the Chernobyl catastrophe, principles of radioprotective feeding.

Be able to prognose medical hygienic consequences of emergency influence on a population and personnel of the rescue units, to estimate terms them temporal location in the field habitations and different type depositories; to carry out sanitary-hygienic control after a feed and water-supply of personnel of the rescue forming and population in emergencies, to conduct examination of quality and unconcern of food raw material, products and prepared foods, choose the source of water-supply and conduct control after quality of water preparing with the use of table facilities, to organize and to conduct medical preventive measures in case of infectious intestinal trophonosiss, helminthisms, food poisonings, defeats, through a meal and water by poisonous and radio-active matters, bacterial facilities; to estimate the degree of radiation contamination of environmental objects and its possible consequences for the population health, to ground measures in relation to limitation of levels of irradiation of population.

### **Basics knowledge, abilities and skills**

Concept about failures, catastrophes, emergencies, classification of emergencies on reasons of origin, levels of emergencies [medicine of catastrophes]; hygienic requirements are to planning and sanitary proper equipment of lands for the field habitations, intended for placing of population and personnel of the rescue units during emergencies; hygienic requirements for the microclimate and chemical solution of air in the field habitations and fortification buildings of different type [general hygiene]. Hygienic requirements to the rational feed, arranging, equipment and work of cookery; indexes and methods of estimation of food adequacy after a menu-lay-out, qualities of basic food, sanitary state of objects of public food consumption stuffs; physiology norms for feeding of different professional and age-old groups of population; classification of the food poisonings, measures of their prevention and method of investigation of cases; organization and leadthrough of hygienical examination of food is in the field terms by table facilities [general hygiene]. Water sources, comparative hygienical description; methods of sampling and analysis of water; indexes of quality of drinking-water, methods of its improvement; organization and leadthrough of secret service of sources of water-supply in emergencies; research of water quality in the field terms by table facilities; methods and table facilities of cleaning, disinfection and rendering of water harmless in the field terms [general hygiene].

Qualitative and quantitative properties of radionuclides and photonic radiation; methods of measuring of radioactivity of environmental objects; biological action of ionizing radiation, main types of radiation damage; categories of persons who are exposed to rays; hygienic regulation of radiation influence on human organism, groups of radiation and hygienic regulations; classification of sources of ionizing radiation, their general radiation and hygienic characteristics; principles of protecting from an ionizing radiation; classifications of radiation failures and feature of failure on CNPP; features of pathology forming among population of Ukraine in post-fault period [radiation medicine, general hygiene].

### **Content of the lesson**

Determination and classification of emergencies, their influence on the sanitary-hygienic terms of dwelling of population and labour conditions of the rescue units. International and national organizational structures for liquidation of medical consequences of emergencies. Basic principles

of organization of the sanitary-hygienic and disease providing, temporal placing of a victim of population and rescuers, during emergency, principles of prognostication medical hygienic consequences of emergencies. The hygienic setting of norms is at emergency contamination of environment.

Principles and forms of organization of feed and water-supply of the rescue forming and population during emergencies. Requirement to the field points of feed, field points of water-supply and water spread points. Organization of feed and water-supply in emergencies under the medical and sanitary inspection. Methods of controlling the adequacy of food, food products and drinking-water quality, improvement of water quality. Organizationally regular forming and laboratory facilities of medical service for the leadthrough of examination of food and water in emergencies. Objects, tasks, stages of medical examination of food and water, types of expert conclusions. Methods of prevention of infectious intestinal trophonosiss, helminthisms, food poisonings, defeats, through a meal and water by poisonous and radio-active matters, bacterial facilities.

Natural radiation background and its components. Hygienic characteristic of radioactive contamination of environment as a result of failure on CNPP, characteristic of main dose-constituent radionuclides, ways of contamination of environment objects by them, radiation characteristic of natural  $\gamma$ -background, soil, drinking-water, foodstuffs, their role in forming of the radiation load of population. Concept about the technogeneous increased radiation sources of ionizing radiation, their role in forming of the radiation load of population, criteria of quantitative estimation and hygienic regulations. Principles of estimation of results of radioactivity measuring of environmental objects. Monitoring of population irradiation, its components. Essence of conception of residence of Ukrainian population on territories with the heightened levels of radioactive contamination. Principles and criteria of zoning, legal status of territories which were exposed to the radioactive contamination as a result of the Chernobyl catastrophe. Hygienical aspects of way of life, nutrition, labour and rest of population who live on territories with the heightened levels of radioactive contamination. Ways of decline of doses of external and internal irradiation of population. Principles of radioprotective feeding and measures of its realization. Hygienic regulations of irradiation of emergency personnel and population during liquidation of consequences of radiation failure.

### **Pre-class self-training work**

#### **Control questions**

1. Determination of concept and classification of emergencies, their influence on the sanitary-hygienic terms of dwelling of population and labour conditions of the rescue units. National organizational structures for liquidation of medical consequences of emergencies. Organization of sanitary-hygienic and disease prevention measures during emergencies. Basic sanitary-hygienic measures in emergencies.

2. Types of the field placing for population and rescue units in emergencies, unfavourable factors of dwelling in the field habitation. Hygienic requirements for the area and planning of camp.

3. Classification of shelters, requirement, to their planning and equipments, basic harmfulness, modes of ventilation, norm of area, cubic capacity, content of carbon dioxide and microclimate in depositories.

4. Initial data, that necessary for operative prognostication medical hygienic consequences of influence of emergencies on a population and personnel of the rescue units.

5. Measures of defences for a population in the extraordinary situations of chemical, biological and radiation character. Emergency MAC and normative defences of rescuers and population during the emergencies.

6. Argues of rational feed and methods of hygienic control after its adequacy and safety at emergencies. Organization forms of feed of the rescue units and population in emergencies. Dry stakes, subhigh-calorie stakes, rations of survival, food concentrates, as facilities of feed in a sharp

period of emergencies, then hygienic description. Hygienic requirements to the field points of feed.

7. Diseases, related to inferiority and poor quality of feed. An order of investigation and methods of prophylaxis of the food poisonings in emergencies.

8. Objects, tasks, stages of medical examination of food and variants of expert conclusions. Indexes, which characterize freshness, commodity qualities of food products, sign of their spoilage, epidemiology and toxicological danger.

9. Types of water-supply of the rescue forming and population in emergencies. Norms of water-supply in the field location. Purpose and stages of reconnaissance of sources of water-supply. Hygienic requirements to the field point of water-supply and water spread points. Methods and facilities of improvement of the water quality in the field locations. Methods of cleaning, disinfection and rendering of water harmless at emergency situations.

10. Sources, factors and mechanisms of infection of products and water, by poisonous, nuclear and bacterial substances.

11. Subsections of medical service, participating in examinations of food and drinking-water. Table facilities, intended for the examination of food and water.

12. Natural radiation background and its components. Sources and ways of radioactive contamination of environmental objects. Characteristic of main dose-constituent radionuclides after a failure on CNPP. Radiation characteristics of natural  $\gamma$ -background, soil, drinking-water, foodstuffs after a failure on CNPP, their role in forming of the radiation load of population. Principles of radiometric researches and estimation of results of radioactivity measuring of environmental objects.

13. Classifications of radiation failures and feature of failure on CNPP. Hygienic regulations of irradiation of emergency personnel and population during liquidation of consequences of radiation failure.

14. Concept about the technogeneous increased radiation sources of ionizing radiations, their role in forming of the radiation load of population, criteria of quantitative estimation and hygienic regulations.

15. Principles and criteria of zoning of territories which were exposed to the radioactive contamination as a result of the Chernobyl catastrophe. Hygienic aspects of way of life, nutrition, labour and rest of population who live on territories with the heightened levels of radioactive contamination. Monitoring of population irradiation, its components. Ways of decline of doses of external and internal irradiation of population. Principles of radioprotective nutrition and measures of its realization.

### **Control tasks**

1. To acquire basic terms which characterize an emergency.

2. To diagrammatize organizational structure of the unique state system of organs of executive power on questions prevention and reacting on emergencies.

3. To calculate the necessary volume of ventilation of shelter and maximal terms of staying in him of the rescue unit from data of situational tasks 4.1-4.2.

4. To make the list of organization methods of feed of the rescue formings and population at the terms of emergency. To diagrammatize dislocation of the field point of feed (food point).

5. To make the list of methods of the field water supply for the rescue formings and population at the field location. To diagrammatize location of the field point of water supply.

6. To chart the scheme of radioprotective nutrition and measures of its realization.

### **Practical employment**

#### **Preparatory stage (15%)**

I. Statement of the educational purposes.

II. Control of initial level of knowledges, skills and abilities, base disciplines purchased at a study, and implementation of pre-class independent work.

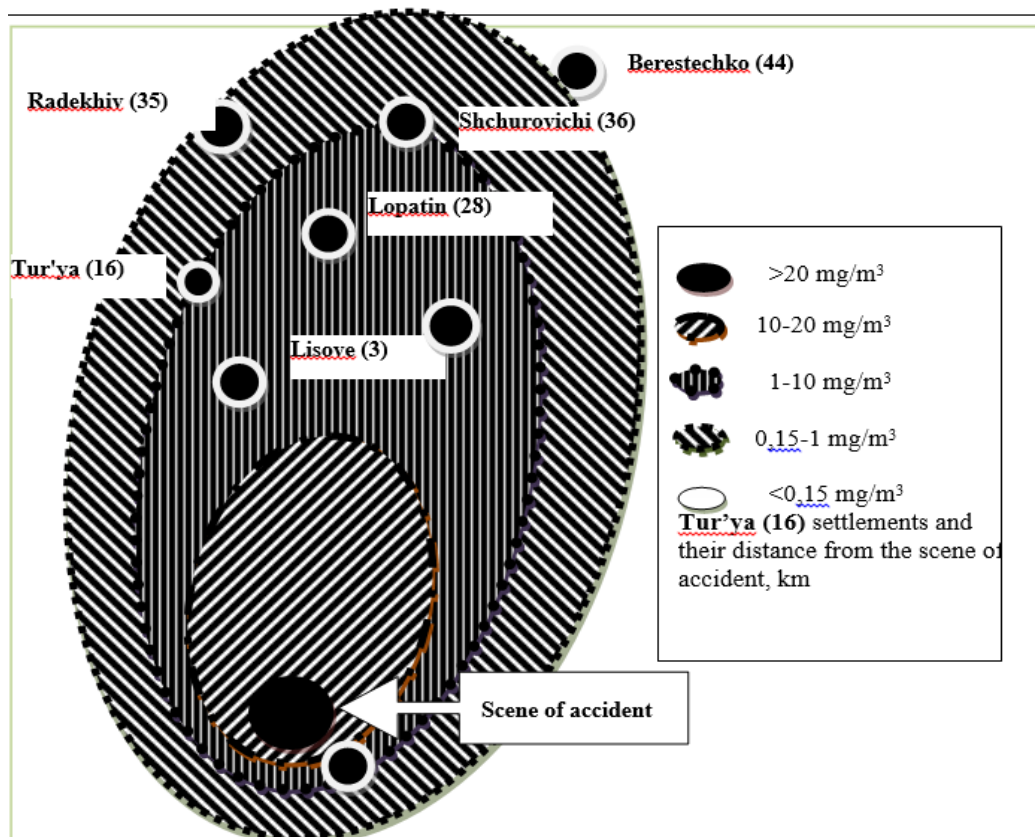
### **Basic stage (70%)**

1. To define from data of situational task a class, group and level of emergency using a state classifier.

*Task.* 16.07.2007 oh 16.55 near the station of Ozhidiv of the Lviv railway happened failure of train, which was folded with 58th carriages, including to 15 of 50-ton cisterns, filled with yellow phosphorus. Because of damage at an ascent from track of 6 cisterns the source of phosphorus took place on the area of about 300 sq m. From the contact of phosphorus with air there was a fire during extinguishing of which a toxic cloud appeared from the products of burning and their reaction with water. During a few days a cloud spread on territory by an area 193,5 sq km and 97 settlements of 5 administrative districts of Lvov, in which lived over 43 thousands of inhabitants. The lost was not during a failure; with the symptoms of defeat of burning of yellow phosphorus products on stationary treatment in medical establishments of the Lviv and Volhynia areas was 414 persons, including 86 rescuers; evacuation from the usual places of dwelling was tested by 1750 persons. General charges, related to the failure and liquidation of its consequences made about 100 million hryvnias.

2. To make the prognosis of medical hygienic consequences of emergency for population and personnel of rescue units from data of situational task, to calculate an emergency different time acceptable levels of atmosphere pollution for a population and rescuers and possible time of their stay in the area of defeat, to argue the necessary sanitary-hygienic measures.

*Task.* After physical and chemical properties of matters (volatility, dispersion, closeness, capacity for transformations in an environment), descriptions of source of extras (amount of extras, their temperature, speed of selection, height of extras, area of surface of extras), meteorological situation (temperature and humidity of air, direction and speed of wind, presence of fallouts), character of surface of distribution (relief, building of locality), the geographical co-ordinates of event (coefficient of stratification) develop the mathematical model of distribution of products of burning of yellow phosphorus and the area of possible defeat for expected period to 4 hours (pic 1). Maximum allowable concentrations of phosphoric anhydride ( $P_2O_5$ ) in air of working area –  $1 \text{ mg/m}^3$  (aerosol, II class), in atmospheric air –  $0,05 \text{ mg/m}^3$  (average daily) and  $0,15 \text{ mg/m}^3$  (maximal valid for one occasion).



**Picture 1.** An area of possible defeat because of railway failure.

3. To conduct from data of situational task the hygienic estimation of area for the location of camp, to diagrammatize camp for the rescue unit.

*Task.* An area for placing of camp is situated on a northwestern riverside. The area borders on mixed forest on north-west, steep low riverside on a southeast. An area is dry, with unpolluted sandy loam soil, to the low standings of ground waters and sloping in a southeast side by the slope of relief, which is, covered the liquid forest and bush. Railway is located in the distance of a 1,2 km after the river. Dominating direction of winds in this locality is north-west. The objects, which contaminate atmospheric air are absent in a 3,5 km distance. It is foreseen to dispose a bathhouse and laundry on the separate area of steep riverside in the distance 80 m from the camp below on stream of the river. For taking of flow waters the equipment of filtration ditch is planned with lowering of the cleared flow waters in the river. The river is suitable for bathing as for sanitary standards.

4. To expect from data of tasks the amount of dry chloric lime for the disinfection of water by different methods and to estimate efficiency of disinfection, ground measures, directed on the increase of efficiency of disinfection of water.

*Task 1.* To expect the amount of dry chloric lime for a disinfection after chlorine requirement of water in the reservoir of RDV-1000, if on titration 200 ml of water, where 6 drops of a 1% solution of chloric lime are brought in at the trial chlorinating, 2 drops of a 0,7% solution of thiosulphate of sodium are spent (one drop links 0,04 mg of active chlorine).

*Task 2.* After a flood for the inhabitants of village, which used water from mine wells, the flash of intestinal infection is registered. By the specialists of SES it was found out investigation of reasons of origin of hearth of infection spore forms of excitors in water of wells. Hyperchlorinating of well water is conducted by a by volume method by the dose of 100,0 mg of active chlorine on 1 L of water by bringing 200 g 27% dry chloric lime. The frame of well is cylinder, a diameter a cut is 0,5 meters, a height of post of water is 5 m.



5. To conduct from data of task [1, P. 590-591] investigation of case of the mass food poisoning in rescue subsection, to develop health and prophylactic measures.

6. To estimate from positions of rational feed composition of daily ration at a caldron feed and dry a ration member of the rescue forming after norms, ratified Decision of Cabinet of Ministers of Ukraine № 426 from March, 29 in 2002

Norm № 1 – general military at a caldron feed.

Name of products	Mass of gross, g	Mass is a net, g	Amount, g			Calories, kcal
			protein	fat	carbohy drate	
Bread is from mixture of flour of rye peeled and wheat (Ist rate)	350	350	20,65	3,85	164,85	794,5
Bread is from the flour of wheat of Ist class	400	400	30,4	3,6	187,6	924
Flour wheat Ist rate	50	50	5,3	0,65	33,9	165,5
Flour wheat 2 <sup>nd</sup> rate	15	15	1,76	0,27	9,65	48,6
Different groats (wheat)	120	118,8	13,66	1,54	75,8	375,4
Macaroni (Pastas)	40	40	4,28	0,52	27,44	134
Meat (beef of Ist rate)	200	150	27,9	24	–	327
Fish (silver hake)	150	85,5	14,2	1,88	–	73,5
Fats are animal melted, margarine	15	15	–	14,96	–	134,55
Butter	25	25	–	24,98	–	224,75
Cheese hard	15	14,4	3,41	4,39	–	54,3
Butter	30	30	0,15	24,75	0,24	224,4
Hens Eggs (2 for a week)	13,4	11,68	1,48	1,34	0,08	18,3
Sugar	70	70	–	–	69,86	265,3
Salt, iodine-treated salt	25	25	–	–	–	–
Tea	1,2	1,2	0,24	0,06	0,17	–
Laurel leaves	0,2	0,2	–	–	–	–
Pepper	0,3	0,3	–	–	–	–
Mustard powder	0,3	0,3	0,11	0,03	0,02	0,81
Vinegar	1	1	–	–	–	–
Tomat-pasta	6	6	0,29	–	1,21	5,9
Pressed yeasts	0,5	0,5	0,06	0,01	0,01	–
Potato	600	432	8,64	1,73	74,74	345,6
Cabbage	130	104	1,87	0,1	5,93	28,1
Beet	30	24	0,36	0,02	2,4	10,1
Carrot	50	40	0,52	0,04	3,36	13,6
Bow	50	42	0,59	–	4,12	17,2
Cucumbers, tomatoes, root, greenery	40	37	0,45	0,18	3,87	15,9
Juices are fruit (apple)	100	100	0,5	–	9,1	38
Multivitamines “Hexavitum”, drop (given out from March, 15 for June, 15)	1	1	–	–	–	–
Together			137	109	674	4239

Norm № 10 is a common to all arm set of dry products.



Name of products	Mass of gross, g	Mass is a net, g	Amount, g			Calories, kcal
			protein	fat	carbohydrate	
Crackers from a flour a wheat Of 1 <sup>st</sup> rate	300	300	31,8	3,9	222	1080
Bread from the flour of wheat of 1 <sup>st</sup> rate	500	500	38	4,5	234,5	1155
Can food is meat (a beef is stewed)	100	100	16,8	17	–	220
Can food the “Sausage stuffing” (amateur)	100	100	11	28,5	3	313
Can food of meat-grossary in an assortment (peeled-barley porridge with meat)	500	500	70	64,5	291,5	2045
Can food is fish (atlantic pilchard)	160	160	28,64	31,52	–	398,4
Clear soup with meat (concentrate)	20	20	3,72	3,2	–	43,6
Jam (apple)	40	40	0,16	–	26,4	100
Sugar	40	40	–	–	39,92	151,6
Drink is fruit (concentrate)	5	5	–	–	4,35	17,5
Tea is soluble with sugar	30	30	–	–	29,94	113,7
Caramel, 6 things (lollipops)	36	36	–	0,04	34,45	133,2
Multivitamines “Hexavitum”, drop	1	1	–	–	–	–
Together			200	153	886	5771

7. To estimate from data of situational task the degree of contamination of foodstuffs by such radionuclides as  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$ , to define and estimate the annual effective dose of internal irradiation of population due to these foodstuffs, to ground measures in relation to the decline of population irradiation.

*Task.* The mean values of activities of  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$  in foodstuffs and actual annual consumption of these foodstuffs at a rate per person from data of regional statistical management over 2009 are presented in a table. The activities of radionuclides in foodstuffs are determined by the specialists of department of radiation hygiene of regional sanitation and epidemiological center by means of radiometric assay.

Indices	Foodstuffs						
	Milk and dairy products	Meat and meat foods	Fish and fish foods	Groats, flour, bread, leguminous and macaroni foods	Potato	Vegetables and water melons	Fruits, berries
Actual annual consumption of foodstuffs per person, kg/year	233,9	44,7	14,8	119,2	155,3	128,4	41,9
Activity of $^{137}\text{Cs}$ , Bq/kg	200	110	100	10	46	35	55
Activity of $^{90}\text{Sr}$ , Bq/kg	50	15	24	3	19	10	8

8. To estimate from data of situational task a radiation situation in a dwelling house, to ground measures in relation to the decline of irradiation of its habitants.

*Task.* The estimation of radiation situation in living quarters was carried out by the specialists

of local sanitation and epidemiological center at set in operation of dwelling-house. Average annual equivalent equilibrium volumetric activity of radon in the air of living quarters is equal 25-45 Bq/m<sup>3</sup>, of thoron – 1-2 Bq/m<sup>3</sup>, absorbed dose rate in the air – 35-40 μR/hour. Effective specific activity of natural radionuclides in the applied building materials is: brick – 200 Bq/kg, concrete, cement – 150 Bq/kg, facing tile – 500 Bq/kg. General volumetric activity of α-ray radiators in a drinking-water from water passage – 0,02 Bq/dm<sup>3</sup>, of β-ray radiators – 0,1 Bq/dm<sup>3</sup>.

9. To chart the fundamental scheme of zoning of Ukrainian districts contaminated by radioactive substances as a result of the Chornobyl catastrophe, and criteria of this zoning, to define after evaluation scales permissible levels of radiocontamination of water, foodstuffs and rations, atmospheric air and air of shop floors in these areas.

#### **Final stage (15%)**

1. Control of mastering level of professional abilities and skills.
2. Lead through results of lesson, home task.

## **INDEPENDENT WORKS**

### **TOPIC 1.**

#### **THE HYGIENIC ESTIMATION OF NATURAL AND ANTHROPOGENOUS COMPONENTS OF BIOSPHERE INFLUENCE ON PERSONAL HEALTH AND HEALTH OF THE POPULATION. THE SCIENTIFIC BASES OF MEDICAL BIORYTHMOLOGY AND CHRONOHYGIENE.**

##### **Actuality of theme**

Health of the person and population is defined by joint influence of natural and anthropogenous factors of the biosphere. The main its compounds are atmosphere, hydrosphere, lithosphere. Such nature factors as sunlight, climate, weather can break the natural balance between an organism and environment especially in meteosensitive people to lead to heliometeorotropic reactions, an aggravation of chronic diseases. At the same time those factors are widely used for the preventive and medical purposes (training, climate therapy). Anthropogenous pollution of biosphere has a direct negative influence the health and sanitary-conditions of human life. It is also has negative influences through interrelation with pollution and climate and weather changes (intensity of solar reaction, circulations in the atmosphere, a soil and water basins conditions). Unregular changes of natural factors (solar activity, weather) and urbanization social factors (the schedule of work, a time belt etc.) usually have a contradiction with common rhythms for the personal physiological functions (biorhythms) and lead to development of desynchronozes.

##### **The educational purposes**

To know the theoretical bases and tasks of ecology, its communication with hygiene, structure, properties and hygienic value biosphere compounds, a meteorology role, climatology and medical biorythmology in medicine and hygiene, methodical principles of medical forecasting of influence of weather and a climate on a human body, prevention of heliometeorotropic and climate depended reactions at the healthy and sick person, biorythmological principles of optimisation of daily activity of the person.

To be able to prognose the possible negative consequences of influence of climatic and

weather conditions on an organism of the healthy and sick person, to define a daily curve of biological rhythms and on this basis to develop the recommendation from the rational organisation of daily activity of the person and preventive maintenance of desynchronozes.

#### **Base knowledge, abilities, skills**

Biosphere, its compounds (atmosphere, hydrosphere, lithosphere), V.I.Vernadsky's doctrines about a noosphere, hygienic value biosphere compounds, sources and the basic components of pollution of atmospheric air, waters, soil and their influence on health and sanitary conditions of life of the population [the general hygiene].

Physiology of thermoregulation and adaptation of the person [physiology]; weather and a climate, their hygienic value, classification, weather dependent reactions and diseases, hygienic aspects of acclimatisation, the use of climatic methods with the aim of the improving of health conditions and diseases prevention [the general hygiene].

Biological rhythms, their classification, concept about desynchronozes [the general hygiene].

#### **The theme maintenance**

The communication of ecology and hygiene. Biosphere, its structure, the general laws of influence of denatured biospheres on population health (hygiene laws). Modern problems and tasks of environmental protection.

The peculiarities of influence of natural factors of environment on population health. Medical classifications of weather. A technique of mediko-meteorological forecasting. Preventive meagers (permanent, seasonal, immediate) of heliometeorotropic reactions at the healthy and sick person. The general and applied classifications of a climate. Preventive maintenance climate depended reactions. Structure and the organisation of service of supervision of climatic both weather conditions and their forecasting.

Biological rhythms, their classification, the basic characteristics, their influence on health of the person. Studing and calculation of biological rhythms of the person. Concept about desynchronozes, the kinds of desynchronozes. Chronohygiene as the preventive maintenance basis of desynchronozes. Studing of the types of daily working capacity of the person. Biorytmology principles of the rational organization of daily activity of the person.

#### **Control questions**

1. Environment, its components. Biosphere, its structure. Global character and the general laws of pollution of biosphere. Positive and negative consequences of influence scientifically – technical revolution on environment and health. The scientific bases and the ways of preservation of the environment from pollution. The general laws of influence of environment on population health (hygiene laws).

2. Weather, the factors which form and characterize the weather. The laws of atmospheric circulation. The basic thermobarometric processes (a cyclone, an anticyclone).

3. Heliometeorotropic reactions of the person, definition of concepts, the mechanism of their occurrence, principles and methods of its prevention. Medical classifications of the weather, value of indicators, which in their basis. Medical forecasting of weather. The dynamics of atmosphere pollution and the influence on health of the population in the conditions of temperature inversion.

4. A climate, the factors which form and characterise regional climate. Classification and the hygienic characteristic of climatic belts. Climatic belts of Ukraine. Acclimatisation, its phases. Factors which influence acclimatisation in the conditions of the North, the South, arid areas and high mountains. The use of climatic factors for the improving and preventive purposes, sanatorium treatment at various diseases, climatic resorts of Ukraine.

5. Biological rhythms, the classifications conducting the characteristics (level, the period, amplitude, acrophase, the form of a daily curve etc.), influence on health of the person. The types of daily curve biological rhythms, a definition technique. A technique of definition of type of daily working capacity of the person. A technique of definition of settlement biological rhythms of the

person. Concept about desynchronoses as a principal type of chronopathology, the kinds of desynchronoses. Biorythmology principles of the rational organisation of daily activity of the person. Chronohygiene as the preventive basis of desynchronoses.

### **Control tasks**

1. To estimate under the medical classification of weather type, as for concerning of the development cardiovascular pathologies to develop preventive recommendations for the patient with this pathology according to a situational task.
2. To estimate climatic conditions of district and character of acclimatisation of the person, to develop hygienic recommendations concerning the optimum adaptation of the person to residing and works in the conditions of this climate behind data of a situational problem.
3. To define own type of a daily curve of biological rhythms.
4. To define own type of daily working capacity.
5. To define own biological rhythms by mathematic method.

## **TOPIC 2.**

### **A HYGIENICAL ESTIMATION OF TERMS OF STAY OF PATIENTS IN MEDICAL ESTABLISHMENTS. FEATURES OF ANTIRADIATION PROTECTION OF PERSONNEL AND PATIENTS IN X-RAY AND RADIOLOGICAL DEPARTMENTS OF HOSPITALS**

#### **Actuality of theme**

The terms of stay of patients in MPE must eliminate negative influence of factors of hospital environment and provide a patient a complete hygienical, somatic and psychical comfort. The hygienical estimation of terms of stay of patients in MPE includes control after the observance of norms of capacity of hospital wards and hygienical requirements to the microclimate, chemical and bacterial composition of air, regime of ventilation, illumination of apartments, water-supply, removal and disinfestation of solid and liquid waste, cleaning up of apartments, organization of feed of patients, observance, by them rules of the personal hygiene.

It's necessary, except the detailed account of all doses of irradiation, to careful observance of requirements of radiation safety to placing, to planning, sanitary and technical, antiradiation equipment, types of duty of X-ray and radiological departments of care institutions (CI), working conditions and personal hygiene of medical personnel for minimization of negative influence of ionizing radiations on the health of personnel and patients of (CI).

#### **Learning aims**

To know hygienical requirements to the terms of stay of patients in MPE; the methods of application of nonradionuclide and radionuclide sources of ionizing radiations in medicine, hygienical requirements to planning, sanitary and technical, antiradiation equipment, types of duty of X-ray and radiological departments of CI, working conditions and personal hygiene of medical personnel.

Able to conduct the complex inspection of terms of stay of patients in MPE, research them by laboratory instrumental methods, to estimate the got results and to ground prophylactic measures; to estimate the planning, sanitary and technical, antiradiation equipment, types of duty of X-ray and radiological departments of CI, working conditions and personal hygiene of medical personnel on the ground of radiation safety.

#### **Base knowledge, abilities and skills**

General method of current sanitary supervision; methods of sanitary-hygenic inspection of object; the basic hygienical requirements to the capacity of hospital wards, parameters of microclimate, air environment, illumination, ventilation, delete and defuzing of solid and liquid waste [general hygiene].

Sources of ionizing radiations which are used in medical practice, their qualitative and

quantitative characteristics; main principles of radiation safety and their providing; radiation safety and antiradiation protection of personnel and patients at application of nonradionuclide and radionuclide sources of ionizing radiations in CI; types of control during work of personnel of CI with sources of ionizing radiations [radiation medicine, general hygiene].

### **Content of theme**

Unfavorable factors of in-hospital environment of different subsections of CI. The basic hygienical requirements to the modes of exploitation of medical, diagnostic, auxiliary and domestic apartments of hospital permanent establishment and polyclinic. Hygienical norms of microclimate, air environment, ventilation, natural and artificial illumination of different subsections of CI. Chart of sanitary-hygenic inspection of hospital.

Methods of application of nonradionuclide and radionuclide sources of ionizing radiations in CI with a diagnostic and medical aim. Characteristics of radiation danger in X-ray diagnostic room and conditions of which it depends on. Structure of radiological department of hospital. Features of radiation danger and antiradiation protection during realization of teletherapy and contact radiotherapy by means of bare and sealed sources of ionizing radiations. Requirements to planning of X-ray and radiological departments, their sanitary and technical, antiradiation equipment, types of duty. Methods of collection and rendering of radioactive wastes during work with the bare sources of ionizing radiations. Regulations of radiation safety of personnel of CI and patients. Ways of decline of the radiation load of personnel and patients. Operating conditions, personal hygiene and benefits of personnel.

### **Control questions**

1. Sanitariness of CI, its kinds, hygienical value. Sanitary-hygenic mode of LPZ, its constituents, hygienical value.

2. Hygienical requirements to the microclimate, chemical and bacterial composition of air, ventilation, heating, natural and artificial illumination, water-supply, cleaning up of different apartments of CI, collection, delete and defusing of liquid, solid and specific waste which appear in CI, personal hygiene of patients.

3. Methods of application of sources of ionizing radiations in medical practice.

4. Characteristics of radiation danger and antiradiation protection during realization of X-ray procedures. Requirements to planning, sanitary and technical equipment, type of duty of X-ray room.

5. Features of radiation danger and antiradiation protection during realization of the teletherapy. Requirements to planning, sanitary and technical equipment, type of duty of department of teletherapy.

6. Features of radiation danger and antiradiation protection during realization of the contact radiotherapy by sealed and bare radionuclide sources. Requirements to planning, sanitary and technical equipment, type of duty of department for treatment with sealed radionuclide sources. Methods of collection and rendering of radioactive wastes during work with the bare sources of ionizing radiations.

7. Radiation control in X-ray and radiological departments of CI. Regulations of radiation safety, operating conditions, personal hygiene and benefits of personnel. Recommended levels of irradiation of patients of different categories.

### **Control tasks**

1. From data of situational task to make a hygienical conclusion and ground measures on the improvement of the sanitary-hygenic and disease mode in a polyclinic.

*Task.* Results of researches of sanitary-hygenic terms in the apartments of district polyclinic, counted on 960 visits for a change, resulted in a table.

Apartment	Area, m <sup>2</sup>	Temperature, °C	Relative humidity, %	Rate of movement of air, m/sec	CNI, %	Illumination, lk	Noise-level (in the day-time), dBA
Cabinet of doctor-internist	10	20	60	0,1	1,0	300	20
Cabinet of surgeon	20	18	50	0,2	1,0	300	30
Manipulation	12	20	55	0,05	1,5	400	25

2. To chart the planning scheme:

- a) X-ray diagnostic room;
- b) unit of  $\gamma$ -teletherapy;
- c) unit of contact radiotherapy by the sealed radionuclide sources;
- d) unit of contact radiotherapy by the bare radionuclide sources.

3. To fill the summary table of radiation characteristics of treatment rooms of X-ray and radiological departments of CI.

Treatment room	Sources of ionizing radiations	Characteristics radiation danger	Measures of antiradiation protection		
			personnel	patients	adjoined premises
X-ray room					
Unit of $\gamma$ -teletherapy					
Unit of contact radiotherapy by the sealed radionuclide sources					
Unit of contact radiotherapy by the bare radionuclide sources					

### TOPIC 3.

## FOOD POISONINGS AS A HYGIENIC PROBLEM. METHODS OF INVESTIGATION OF FOOD POISONING CASES.

### Actuality of theme

Food poisonings of the microbial and non-microbial origin are occurred as a result of contamination of foodstuff and cooked dishes by specific microorganisms and admixtures of chemical substances during of violation of sanitary-and-hygienic requirements relating to production, transportation, storage and realization of food production. Frequency of these diseases in Ukraine is enough high and is associated with reduction of the control over quality of alimentary raw materials and finished products, low level of hygienic skills of workers of the food industry, nutrition units, trade, with globalization of trade and increasing of food production assortment. For the purpose of identification the causes of food poisoning occurrence, working out measures for its liquidation and preventive the further occurrence it's important to investigate by the sanitary-and-epidemiological service (SES) of each food poisoning. Efficacy of this investigation first of all depends on timely informing the SES by the treatment doctor about the found event of food poisoning and screening of sample of suspicious products for laboratory examination.

### Learning aims

To know the classification, etiology, pathogenesis, clinic, main principles of prevention of food poisonings, duties of the treatment doctors and hygienists during the investigation of food poisonings, regulations which define preventive measures and order of investigation of food poisonings.

To be able to establish the causes of occurrence and character of food poisonings, to give the emergency medical aid by victims, to organize and make investigation, to draw up the emergency report.

### Base knowledge, abilities and skills

Concept about quality and safety of foodstuff, microbiologic criteria and norms of safety [microbiology, general hygiene]; concept about food poisonings, their classification by etiological and pathogenetic signs, the occurrence causes [general hygiene], properties of agents [microbiology], clinic of microbial food poisonings and infectious diseases which are transmit through food [infectious diseases]; procedure of investigation of food poisonings case, order of sampling of food production, a biological stuff and swabs for laboratory research, drawing up of the accompanying documentation [general hygiene]; registration and the stocktaking of events of food poisonings [epidemiology]; main principles of prevention of food poisonings of microbial and not microbial etiology [general hygiene, epidemiology].

### **Content of the lesson**

Food poisonings, their definition, classification, modern views on classification. Alimentary toxicoinfections, bacterial and mycotoxicoses, definition, etiology, diagnostics, clinic, preventive principles. Food poisonings of non-microbial nature (by venenate plants and tissues of animals; foodstuff, which are toxicant under certain conditions; chemicals admixing). Food poisonings of an unknown etiology, a hypothesis of their occurrence, feature of clinic. Procedure of investigation of the causes of food poisonings, participation and duties of doctors-hygienists and medical doctors. Legislative and guidelines documents which define the measures of prevention and order of investigation of food poisonings. Measures of liquidation and prevention of events of food poisonings.

### **Control questions**

1. Food poisonings, their definition and classification.
2. Alimentary toxicoinfections, definition, etiology, diagnostics, clinic, prevention.
3. Bacterial toxicoses, their etiology, diagnostics, clinic, prevention.
4. Mycotoxicoses, their etiology, diagnostics, clinic, preventive measures.
5. Food poisonings of the non-microbial origin, their etiology, diagnostics, clinic, preventive measures.
6. Food poisonings of unknown origin, hypotheses of their occurrence, features of clinic.
7. Method of investigation of food poisonings causes. Documents which erw drawn during the food poisoning investigation. Legislative and guidelines documents which define the preventive measures and the order of food poisonings investigation. Measures of liquidation and prevention of events of food poisonings.

### **Control task**

To draw the algorithm of food poisoning investigation.

## **TOPIC 4. OCCUPATIONAL HYGIENE OF MEDICAL WORKERS IN MEDICAL ESTABLISHMENTS**

### **Actuality of theme**

The work of physicians is the special type of labour activity which is characterized by high nervous emotional, psychical and mental tension, permanent contact, with pathogens, by an unfavourable chemical and physical properties of the occupational environment (discomfort microclimate, contamination of air and objects medical, disinfections and other chemical matters, influence of ionizing radiations, electromagnetic fields of different ranges, noise, vibration, to the ultrasound and others like that), forced position of body, expressed visual tension, physical loadings, violation of optimum structure of the mode of day, by absence of the proper terms for brief rest during a change. The noted factors predetermine the high level of morbidity of medical

staff, in the structure of which ischemic, hypertensive illness, allergic, gynaecological diseases, complications of pregnancy, illness of locomotorium, paropsis and ear, prevail and others like that. For the reducing of influence of negative occupational factors, prevention of origin of professional and professionally predefined diseases, the necessity of introduction of the purposeful system of prophylactic measures, which would combine legislative, appears in the conditions of medical establishments (ME), administratively organizational, architectonically plan and sanitary-hygienic measures.

### **Educational aims**

To know hygienically description of professional hazards and physiological and hygienic features of labour of medical workers of different specialities.

To be able to estimate the terms of labour of medical personnel of medical institutions, define risk factors and their possible negative consequences for a health, to prove the measures of optimization of terms of labour.

### **Base knowledge of ability and skills**

The role of doctor internist in the realization of current sanitary supervision after medical establishments; hygienical requirements to building, planning of area and basic structural subdivisions, sanitary equipping (heating, ventilation, illumination, water-supply, sewage system) with modern amenities, and sanitary disease to the mode of ME; hygienical criteria and methods of estimation of microclimate, chemical and microbial composition of air, illumination of apartments, quality of drinking-water, disinfections facilities; in-hospital infections (VLI), hygienical value, sources, mechanisms of transmission, consequences, measures of prophylaxis; requirement to the personal hygiene of personnel and patients; influence of process and terms of labour on an organism, modern hygienical job classification, hygienical estimation of character and terms of labour, measures of prophylaxis them unfavourable action on a health of workings [general hygiene, hygiene and ecology].

### **Table of contents of theme**

Hygienical value of planning, equipment, optimum mode of exploitation of ME, as terms of creation of safe terms of labour of medical personnel. Professional harmfulness, hygiene and labour of medical personnel of different separations (therapeutic, surgical, infectious, reanimation, psychoneurology, diagnostic, physical therapy and others like that) and laboratories of ME protection. Legislative and organizational measures are on a labour of medical personnel protection. Providing of favourable terms of labour, prophylaxis of intrahospital infections and professional diseases among a medical personnel, personal hygiene of medical personnel.

### **Control questions**

1. Hygienical value of planning, the equipment, optimum mode of exploitation of ME, as terms of creation of safe terms of labour of medical personnel.

2. Professional harmfulness, hygiene and labour of medical personnel of different units (therapeutic, surgical, infectious, reanimation, psychoneurology, diagnostic, physical therapy and others like that) and laboratories of ME protection.

3. Legislative and organizational measures are on a labour of medical personnel protection.

4. Providing of favourable terms of labour, prophylaxis of in-hospital infection and professional diseases among a medical personnel, personal hygiene of medical personnel.

### **Control task**

To make according to the below chart the list of unfavourable factors of occupational environment and labour process, incident to activity of doctors of different specialities; possible professional and professionally predefined diseases and measures of their prophylaxis, sparing the special attention medical contra-indications to work, to periodicity of passing of medical reviews, list of necessary inspections, by doctors-specialists and laboratory instrumental researches, to the right on the increase of post salaries receipt of annual additional vacations.



Variant	Medical speciality	Unfavourable factors of occupational environment and labour process	Professional and predefined occupational diseases	Prophylactic measures
1	Surgeon			
2	Anaesthesiologist-reanimatologist			
3	Obstetrics-gynaecologist			
4	Internist of permanent establishment			
5	Internist of polyclinic			
6	Infectionist			
7	Phthisiatrician			
8	Dermatovenerologist			
9	Psychiatrist			
10	Doctor of diagnostic cabinet			
11	Doctor of physiotherapy cabinet			
12	Laboratory doctor-assistant			

## TOPIC 5.

### **HYGIENIC PRINCIPLES OF THE RATIONAL ORGANIZATION OF PHYSICAL AND LABOUR TRAINING OF CHILDREN AND ADOLESCENT. SCIENTIFIC BASES OF CARRYING OUT OF MEDICAL-AND-PROFESSIONAL CONSULTATION.**

#### **Actuality of theme**

Physical and labour training is the organized process of influence on a children's organism of physical exercises and labour operations which to promote motor performance optimization, to rise the resistance of organism to unfavorable environmental factors, to improve the physical development and health strengthening, to form and improve of motorial qualities, the abilities and skills for preparation to the future labour activity, and also provide the change of mental work on motion activity and prevent the development of fatigue under condition of control of hygienic requirements to organization of physical and labour training. The important factor of preserving and increasing the health of adolescent during the occupational choice is the medical professional consultation, job counselling and professional selection.

#### **Learning aims**

To know the hygienic bases of the rational organization of physical training, of making fit and labour studying of children and teenagers, carrying out of medical-professional consultation, job counselling and professional selection of schoolboys.

To be able to estimate the organization and conditions of carrying out of such lessons as physical and labour training, efficacy of making fit of children and adolescents, to predict the progress of the future professional activity of adolescents.

#### **Base knowledge, abilities and skills**

Locomotor activity of children and adolescents, its physiologic value, the methods of estimation; physical training as an measure for preserving and increasing the health, hypokinesia prevention [normal physiology, physical training, general hygiene]; hygienic requirements to the organization and conditions of carrying out of physical and labour training of children and adolescents [general hygiene]; making children and adolescent fit [general hygiene, pediatrics].

#### **Content of the lesson**

Means and forms of physical training in children's institutions. Hygienic principles of rational organisation of physical training of children and adolescents. The diseases predetermined by the irrational organization of physical training. Physiological-and-hygienic backgrounds of estimation of physical training lesson. Physical training groups. Hygienic requirements to places for physical training. The medical control of organization of physical training lessons. Physiological-and-hygienic principles of rational making fit of children and adolescents. The basic means of making

fit. Hygienic principles of the rational organization of labour study of pupils. Job counselling as a hygienic problem, its functions and components. Scientific bases of carrying out of medical-professional consultation, job counselling and professional selection. Methods of prognostication of professional progress of adolescents.

### **Control questions**

1. Hygienic principles of the rational organization of physical training of children and adolescents. Means and forms of physical training in children's institutions. Concept of a locomotor activity, criteria of its hygienic estimation. Hypokinesia and hyperkinesia consequences, their prevention.

2. Physiological-and-hygienic principles of estimation of physical training lesson, hygienic requirements to the places for carrying out of physical training.

3. The medical control over organization the physical training of children and adolescence.

4. Physiological-and-hygienic bases of making children and adolescents fit, main principles and methods.

5. Hygienic principles of the rational organization of labour training of children and adolescents. The medical control over the organization of labour training of schoolchildren.

6. Medical-and-professional consultation, job counselling and professional selection, their functions and stages. Methods of prognostication of professional progress of adolescents.

### **Control tasks**

1. To estimate according to the situational task the organization and conditions of carrying out of the lesson of physical training, intensity of a load at the lesson due to the physiological curve of pulse, to define risk factors and their possible negative consequences for children's health, to argue preventive measures [1, P. 441-443].

*Task.* The lessons of physical training in 9-th class are twice for a week on Monday and Thursday at 4-th lesson, the following lesson in the timetable in the conforming days is mathematics and biology. Lessons are hold in sports hall with the size of 8·18 m and height 3 m, allocated in a basement. The lighting coefficient in a hall is 1:7, artificial illumination is provided with 6 filament lamps with specific power of 15 Watt/m<sup>2</sup>. Air temperature in a hall is 20°C, relative air humidity – 79%, rate of air movement – 0,05 km/s. Lesson timekeeping: an introductory part – 10 minutes, the main part – 30 minutes, final part – 5 minutes. General density of lesson is 75%, locomotor density – 55%. Pulse at two surveyed boys was exceeded on 10% in compare with initial level after introductory part, on 50% after the main part, on 5% after final part. Pulse was stabilized through one minute after lesson. Five children who are on a regular medical check-up carried out the identical load during the lesson together with other pupils: 1-th with the rheumatic endocarditis with absent signs of activity of rheumatic process and a circulatory inefficiency tolerated 6 months ago; 2-nd one with the cardiotonsillar syndrome, which was tolerated the year ago; 3-d with bronchial asthma with frequent offences and available signs of respiratory and cardiovascular insufficiency; 4-th with the appendectomy which was tolerated 6 months ago; 5-th with myopia of weak degree.

2. To estimate according to the situational task the organization and conditions of carrying out of the lesson of labour training, to define risk factors and their possible negative consequences for health of children, to argue/

*Task.* The lesson of labor in 6th class descends on Wednesday at 4-5th lessons, 6th lesson – physical training. The labour lesson is hold in the joiner's shop which is allocated on the ground floor in the separate block. Its area is 50 m<sup>2</sup>, the school had. There are 15th machines which are positioned in three ranks perpendicularly to windows, distance between machines – 80 cm, distance between rows of machines – 100 cm. Pupils use the instrument for adults. Air temperature in a workshop – 21°C, relative humidity – 70%, rate of air movement – 0,15 km/s, light coefficient –

1:5, the angle of incidence of light rays on machine tools at internal wall is  $25^\circ$ , the angle of aperture –  $4^\circ$ . The lesson consists of theoretical, practical and final parts. The duration of break between lessons is 10 minutes. Operating time density is 80%. Continuous operation of pupils at joiner's machine tools is 20 minutes. Pupils carry the material in mass of 5 kg during the lesson. during the lesson. The pulse rate of two examined pupils is on 20% higher after lesson than before lesson.

3. To prognosticate the progress of professional study and to argue the recommendations concerning correction of a functional state of the adolescents.

## **TOPIC 6.**

### **THE ORGANIZATION AND LEADTHROUGH OF SANITARY INSPECTION ON THE TERMS OF LABOUR OF RESCUERS OF CONSEQUENCES OF EMERGENCY SITUATIONS**

#### **Actuality of theme**

At emergencies labour of personnel of the rescue formations usually carries extreme character and takes place at harmful or dangerous terms, which can entail the decline of capacity, origin of stress, development of sharp defeats and traumas. A sanitary inspection on the terms of labour of rescuers is carried out forces and facilities of state sanitary epidemiology service or medical service of the civil and soldiery formations with the purpose of warning or diminishing of negative influence of harmful and dangerous terms and character of labour on a health of personnel. A sanitary inspection on the terms of labour of rescuers includes control after the parameters of environment in the district of leadthrough wrecking, providing of individual defence remedies and their correct application facilities.

#### **Educational aims**

To know basic principles of organization of sanitary inspection on the terms of labour of personnel of the rescue units during the emergencies.

To be able to conduct the hygienical estimation of terms and character of labour of personnel of the rescue units during the emergencies, to carry out control after the modes of labour and rest of rescuers, their providing and correct use by them of individual defence remedies, to develop measures on warning or diminishing of negative influence of harmful and dangerous terms and character of labour on a health of personnel.

#### **Base knowledges, abilities and skills**

Harmful and dangerous different character factors which accompany the emergencies [medicine of catastrophes]. Hygienical job on the indexes of harmfulness and unconcern of factors of production environment, weight and tension of labour process classification; reactions of organism on the unfavorable factors of production environment; features of terms of labour of personnel of the rescue units at liquidation of consequences of the emergencies [general hygiene].

#### **Table of contents of theme**

A value of the hygienical providing of terms of labour of the military and civil formations at emergencies. Principles of organization of sanitary supervision after the terms of labour of personnel of the rescue formations during emergency. Hygienical features of terms of labour at emergencies of different origin, their influence on a health and capacity of rescuers. Prophylactic measures of decline of negative action of harmful and dangerous terms and character of labour on a health and capacity of rescuers of emergency. Clinical and psychophysiology methods of estimation of capacity and fatigue of rescuers. Classification of individual protective devices (IPD), that used at liquidation of consequences of emergency.

#### **Control questions**

1. Harmful and dangerous factors of terms and character of labour of rescuers of emergency natural, technogenic, in particular chemical, and social-political character.
2. Criteria of estimation of weight and tension of process of labour, harmfulness and ununconcern of terms of labour of rescuers of emergency.
3. Prophylactic measures, directed on the decline of negative action of harmful and dangerous factors of terms and character of labour of rescuers of emergency.
4. Psycho-emotional tension and stress is in the rescuers of emergency, methods and facilities of their prophylaxis.
5. Classification and hygienical description of IPD, that used by liquidation of consequences of emergency. Criteria of choice of IPD and estimation of their reliability in the concrete extreme terms of labour.
6. The modes of labour are at liquidation of consequences of emergency at the terms of high temperature, chemical contamination of air.
7. Physiology indexes of fatigue and overstrain of rescuers.

### Control tasks

1. To estimate from data of situational task on the basis of hygienical working conditions classification the labour conditions of rescuers in different periods of emergency, to define risk factors and their possible negative consequences for a humans, presence of overstrain for rescuers after the indexes of Kerdo and Khil'debranta, duration of labour and rest at certain weather parameters, possible time of stay in the scene of failure without IPD at the different levels of chemical contamination, list of necessary facilities of individual defence, possible term of stay, in an insulating protective clothing, necessary degrees of defence of filtration IPD of breathing organs and possible time of their use, to ground measures on optimization of terms of labour of rescuers.

*Task.* Subsection of Ministry of emergencies during 7th days liquidated the consequences of fire with yellow phosphorus, which arose up in place of train failure. During all the term of liquidation of consequences of the emergency observed gums, sun, sultry weather with the temperature of air in the day-time 30-36°C, by relative humidity 30-40% for speeds of wind of 1-1,5 m/s. The estimation of chemical contamination of atmosphere was conducted the products of burning of yellow phosphorus (an aerosol with dispersion of about 1 µm) after content of phosphoric anhydride of P<sub>2</sub>O<sub>5</sub> (MAC<sub>wa</sub> =1 mg/m<sup>3</sup>, aerosol of 2nd of class of ununconcern with an expressive irritation). In time of liquidation of consequences of emergency of concentration of P<sub>2</sub>O<sub>5</sub> diminished gradually (table). Every brigade of rescuers was in the scene of accident during a shiftwork, executing work of different degree of weight, which was accompanied the proper functional changes (table).

Days	Concentration of products of burning, mg/m <sup>3</sup>	Category of works	Diastolic pressure	Frequency of heart-throbs	Breathing frequency
1	220	Moderate IIb	100	125	25
2	150	Hard III	120	150	28
3	20	Light Ia	80	80	20
4	15	Moderate IIa	90	100	25
5	10	Hard III	100	140	26
6	5	Moderate IIb	90	110	23
7	1	Light Ib	80	74	21

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