

**MINISTRY OF HEALTH OF UKRAINE**  
**O.O. BOGOMOLETS NATIONAL MEDICAL UNIVERSITY**

**“Approved”**

at the methodological conference of hygiene  
and ecology department

**Head of the department**

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**GUIDELINES**  
**FOR STUDENTS**

<i>Subject</i>	Hygiene and ecology
<i>Module № 1</i>	Assessment of the environment and its impact on the population health
<i>Submodule № 4</i>	Labour hygiene
<i>Topic of the lesson</i>	Hygienic assessment of factors of the labour activity and occupational environment.
<i>Course</i>	6
<i>Faculty</i>	medical
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Kiev

## **1. Learning objective**

1.1. Become familiar with basic principals of organization and realization of medical care of workers of transport, manufacturing and building enterprises and organizations, and with legislative documentation that regulates the work of medical units of enterprises.

1.2. Master fundamentals of record-keeping and report in medical units.

## **2. Basics**

2.1. You should know:

2.1.1. Fundamentals of Ukrainian legislation in the sphere of hygiene and labor protection.

2.1.2. Methods and techniques of intoxication prophylaxis, basic criteria of hygienic standardization of chemical compounds in the working zone air, in the other environments.

2.1.3. Fundamentals of medical (sanitary) control of work conditions of enterprises, compliance to sanitary standards and rules, prevention of occupational diseases and poisonings.

2.2. You should have the following skills:

2.2.1. To use normative and legislative documents during sanitary inspection of working conditions, periodic medical examinations of workers, examination of their state of health, disability examination, during prophylactic and health-improving measures.

2.2.2. To plan sanitary measures and medical care of workers; keep records and reports.

2.2.3. To recognize and investigate cases of poisonings and diseases having chemical character, use appropriate normative and directive documentation.

2.2.4. To draw up the documents concerning investigation of the cases of occupational poisonings and diseases properly.

## **3. Self-training questions**

3.1. Classification of industrial poisonous substances by their origin, chemical structure, degree of danger for organism, cumulative properties and tropism.

3.2. Main penetration routes of industrial poisonous substances into the organism, their complex, combined, synergistic, isolated action.

3.3. Most characteristic indices which indicate the effect of industrial poisonous substances on the organism.

3.4. Types of occupational intoxication and peculiarities of clinical presentation when poisoning with the most widely spread poisonous substances.

3.5. Transformation of occupational poisonous substances in the organism (decomposition, transformation, intermediate products and by-products, their effect on intoxication clinical course).

3.6. Material and functional cumulation of occupational poisonous substances, its significance in the development of occupational poisonings, tropism of poisonous substances.

3.7. Acute and chronic occupational diseases and poisonings, their peculiarities.

3.8. Influence of occupational environmental conditions on toxic action of industrial poisonous substances. Working zone risk factors, which increase (potentiate) the effect of occupational poisonous substance. “Instruction on how to draw up the hygienic and sanitary characteristic of the conditions of work” (1985), as a ground to substantiate the diagnosis of “occupational” disease or poisoning.

3.9. Clinical peculiarities of poisonings with the most widely spread occupational poisonous substances – lead, mercury, benzol, manganese, carbon oxide, hydrogen sulphide and others.

3.10. Main principles and criteria of hygienic standardization of occupational poisonous substances in the working zone air as a ground for the prophylaxis of poisonings. Other methods and techniques of prophylaxis of poisonings.

3.11. Description of the documents, which are to be used in the course of investigation of the cases of occupational poisonings or diseases: - “Emergency report on the acute occupational disease (poisoning)”. (H-3 registration form); “Registration card of occupational disease (poisoning)” (II-5 form); “Registration book of occupational diseases (poisonings)” (II-6 form); “Accident certificate” (H-1 form).

#### **4. Self-training assignments**

4.1. The following microclimate parameters exist in the converter plant: air temperature at the workplace is 25-28°C, air movement rate is 0.5 – 0.6 m/s, air relative humidity is 68 – 70 %. Physical activity per shift at manual steel teeming reaches 3 800 calories. Give the hygienic assessment of working conditions of a steelmaker according to State Standard 12.1.005. – 76 “Air in the working zone” and requirements for hardness and intensity of the work; give your advise regarding sanitation of steel-makers’ work conditions.

4.2. When a regularly scheduled medical examination of the workers, who pour less-common non-ferrous metal (zinc) into small molds was carried out in the works, there were the following changes in peripheral blood detected: blurred reticulosis, basophilic stippling of erythrocytes, decrease of hemoglobin content. When carrying out the examination there was observed the peculiar hardly noticeable sallow pale colour of cutaneous coverings, inconspicuous limbus of chalky-scaly color along the margin of gums, qualitative test for presence of heavy metals in blood was positive; in urine –negative, though there was detected increased content of porphyrin in it.

When carrying out investigation of worker’s conditions of job it was ascertained the following: pouring of metal into molds is done manually, this work is qualified as hard work, pouring area is equipped with aeration system using thermal head, places of pouring of metal are not provided for fume hoods. Temperature of air within workplace zone was 23°C during cold season, during warm season – up to 26°C. Concentration of aerosols of poured metal oxides in workplace zone was within 0.08-0.12 mg/m<sup>3</sup> (MAC – 0.01 mg/m<sup>3</sup>). Workers did not use personal protective equipment.

Tasks:

1. Specify possible causes, which set conditions for origination of this occupational poisoning, substantiate the “occupational poisoning” diagnosis.
2. List main measures the physician must take in case of this occupational poisoning.
3. Describe the clinical picture and prophylaxis of zinc oxide poisonings in detail.

**5. Structure and content of the lesson** (duration of the lesson 160 min + 10 min break)

- 5.1. Preamble – 5-10 min.
- 5.2. Test control for assessment of students’ knowledge datum level – 10-15 min
- 5.3. Theoretical training – 30-40 min.
- 5.4. Typical situational tasks “Krok-2” solution – 30-40 min.
- 5.5. State exams situational tasks solution – 30-40 min.
- 5.6. Test control for assessment of students’ knowledge final level – 10-15 min.

### **Example of the task on investigation of an occupational poisoning case**

On May 16 of current year 8 workers of foundry went to health unit of chemical engineering plant to consult a physician because of the following: in 4-5 hours after the workers had come back from their work on May 14, they felt headache, vast lassitude, asthenia, sore throat, sweetish taste in mouth, later there appeared shiver, repeated vomiting, strong cough. Body temperature rose up to 39°C. By next morning level of health became better; body temperature came down to the norm after intensive perspiration. Having suspected a case of occupational poisoning, the student should do the following:

1. To determine type and extent of medical treatment for patients (in this case: to assign hospitalization or to let them be free from work and to prescribe drug treatment?).
2. To make proper entry in registration card of occupational poisoning.
3. To draw up attendant documents for laboratory examination of patients’ blood and urine.
4. To make notes (tentatively) of professional anamnesis.
5. To describe in detail places of work of the victims according to “Instruction on how to draw up the hygiene and sanitary characteristic of workers’ conditions of work”, 1989.
6. To fill in “Emergency report on the acute occupational poisoning”, in which should be named the enterprise (name, address, workshop), where the poisoning occurred, family names of the victims, date of poisoning, provisional diagnosis, date when the report is sent, the name of the addressee.
7. To make the note about the necessity to telephone to the occupational hygiene department of SES, to inform industrial sanitary inspector and visit the workshop, where the victims worked to examine the conditions of work together with him.
8. During the inspection of the workshop it is necessary to focus attention on metal (zinc) smelting in crucible furnace, as only this process may be the source of

hazardous substances and zinc oxide in particular. During the inspection of the casting house there was ascertained that general ventilation did not function and local ventilation was absent.

9. According to the physician's order, laboratory assistant of SES sampled air to make analysis of zinc oxide concentration. In this sample there was revealed 15 mg/m<sup>3</sup> of zinc oxide that exceeds maximum allowable concentration (MAC) by a factor of 2.5 (MAC of zinc oxide – 5 mg/m<sup>3</sup>) and 7 mg/m<sup>3</sup> of copper aerosol that exceeds MAC by a factor of 14 (MAC – 0.5 mg/m<sup>3</sup>).

10. Results of blood analysis of the victims have shown that they have leukocytosis, increased sugar content in blood, in urine – increased content of porphyrin and urobilin.

*Final decision:*

Data of professional anamnesis, suddenness, collective nature of the disease, non-observance of hygiene and sanitary conditions of work (absence of local ventilation, inoperative general ventilation) and, finally, results of air analysis, undue content of zinc oxide in particular, are evidences of possibility of occupational poisoning with zinc oxide for the reason of these facts we can set the following provisional diagnosis: foundry fever.

*Recommendations:*

1. To perform the smelting process in electric furnaces, where there is no possibility for zinc to enter the air of workrooms.
2. To put general ventilation into operation, install local exhausts above the furnaces and above the places of zinc pouring into molds.

**Forms of the documents, which are used for investigation of occupational disease or poisoning cases**

**1.**

Ministry of Public Health of Ukraine  
City (industrial community) Patient  
care institution

Regarding health protection  
H – 3 registration form is approve  
by Ministry of Public Health of  
Ukraine

**2.1. Emergency report on the acute occupational disease (poisoning)**

1. Enterprise	(name;	address)
2. _____ Workshop	(where	poisoning occurred)
3. Family name, name, patronymic of the victim		
4. _____ Date	of	occupational poisoning
5. _____		Diagnosis
1. Date	of	report posting
_____		

Signature of physician

**2.**

Ministry of Public Health of Ukraine  
City (industrial community) Patient  
care institution

Regarding health protection  
H – 3 registration form is approved  
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Ukraine

**Registration book of occupational diseases (poisonings)**

from \_\_\_\_\_ month 200\_\_

1. Enterprise \_\_\_\_\_
2. Ministry \_\_\_\_\_
3. Branch of industry \_\_\_\_\_

No s/n	Family name, name, patronymic of the patient	Name of shop, department, workshop	Detailed occupation	Diagnosis	Note about diagnosis confirmation by means of special methods	Note

3.

Ministry of Public Health of Ukraine  
City (industrial community) Patient  
care institution

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H – 3 registration form is approve  
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Ukraine

**Registration card of occupational disease (poisoning)**

1. Acute occupational poisoning occurred \_\_\_\_\_ 200 \_\_ (year)
2. Enterprise \_\_\_\_\_ Address \_\_\_\_\_
3. Branch \_\_\_\_\_ of \_\_\_\_\_ industry
4. Workshop, \_\_\_\_\_ department \_\_\_\_\_ (where poisoning occurred)
5. Family name, name, patronymic of the victim \_\_\_\_\_
6. Sex \_\_\_\_\_ Age \_\_\_\_\_
7. Detailed \_\_\_\_\_ occupation \_\_\_\_\_
8. Standing in this shop \_\_\_\_\_
9. Standing in this occupation \_\_\_\_\_
10. Previous \_\_\_\_\_ standing \_\_\_\_\_  
in which type of industry \_\_\_\_\_ in which occupations \_\_\_\_\_
11. Circumstances, \_\_\_\_\_ (entry is made in cases of chronic poisonings)  
under which the poisoning occurred \_\_\_\_\_  
a) what poisonous substance produces the poisoning \_\_\_\_\_  
b) what kind of work was done, when the poisoning occurred \_\_\_\_\_  
c) what is the cause of poisoning by the data of investigation \_\_\_\_\_
12. Main \_\_\_\_\_ symptoms \_\_\_\_\_
13. Diagnosis \_\_\_\_\_ of \_\_\_\_\_ occupational \_\_\_\_\_ poisoning \_\_\_\_\_
14. Relation of chronic poisoning with occupation (present, past, underline)
15. Proximate consequences of occupational poisoning (disease):

Remains at work, is free from work for \_\_\_\_\_days, is assigned hospitalization,  
died (underline).

Date of the card issue \_\_\_\_\_month 200\_\_\_\_\_(year).

Signature of physician



4.

Regarding health protection  
H – 3 registration form is approved  
by Ministry of Health Protection of  
Ukraine

### Accident Certificate

This is issued on \_\_\_\_\_ 200\_\_ (year) by industrial and sanitary  
inspector of \_\_\_\_\_ district \_\_\_\_\_ region

\_\_\_\_\_ People present during the investigation:

1. Name of the enterprise, establishment or farm \_\_\_\_\_
2. Address \_\_\_\_\_
3. Name of the shop, department, workshop  
\_\_\_\_\_
4. Date of accident \_\_\_\_\_ 200\_\_ (year).
5. Circumstances, under which it occurred \_\_\_\_\_
6. Causes \_\_\_\_\_
7. List of victims:

№	Family name, name, patronymic	Age	Standing		Previous work	Diagnosis	Consequences of occupational poisoning	Note
			in this workshop	in this work			Remains at work, is free from work, is assigned hospitalization	

8. Proposed measures and time of execution

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*Signatures of inspection participants:*

**State sanitary inspection** \_\_\_\_\_ **Works**  
**committee** \_\_\_\_\_

Physician of health unit \_\_\_\_\_ Administration \_\_\_\_\_

Copy of this certificate is handed over to the representative of administration:

Signature \_\_\_\_\_ of \_\_\_\_\_ responsible  
person \_\_\_\_\_

Inspector's note concerning further direction of the certificate \_\_\_\_\_

***The occupational exercise load and hazards of the surgical specialties doctors include:***

- the number of surgical interventions – up to 150 per year in general surgery, 170 – in otorhinolaryngology, 370 – in obstetrics and gynecology. The number and complexity of the operations increase with the raising the level of the surgeon's skill;
- the forced body position with the trunk frontal bending and the prolonged static tension of muscles of the shoulder girdle, back and stretched forward arms;
- the hot microclimate of the operating room with high streams of the radioactive heat from the artificial lighting sources (shadowless lamp);
- the ionizing radiation during the X-ray examinations, especially in traumatology, vascular surgery, neurosurgery;
- the toxic effect of the narcosis agents (nitrous oxide, halothane, chloroform, diethyl ether) and anesthetics;
- high mental and nervous-emotional exertion, connected with the complexity and duration of the surgical intervention, possible post-operative complications and responsibility for patient's life.

*Among the diseases afflicting the surgical specialties doctors with temporary disability the most widespread are the diseases of nervous system, cardio-vascular system, digestive system and acute respiratory diseases.*

***Hygienic peculiarities of labour conditions and health status of the therapeutic doctors***

*In case of polyclinic, district service, the leading role belongs to*

- the excess physical load, which depends on the year season
- the size of the doctor's district and the type of the buildings).
- These specialists may also suffer from psycho-emotional exertion
- different physical factors' unfavourable effect – X-ray, UHF, ultrasound, laser and other diagnostic and physiotherapeutic measures,
- chemical harmful substances – the pharmacological preparations, from which nurses suffer more frequently.

Occupational diseases of

*the phthisiatricians, infectiologists, specialists in skin and venereal diseases, helminthologists, the laboratory assistants at the bacteriological, virological, helminthological laboratories* include the corresponding infections;

*phthisiatricians, X-ray doctors, radiologists* suffer from dermatitis, eczemas, toxicodermia, melanomas, leucosis, skin cancer, radiation sickness;

*psychiatrists* – psychoneurosis and others.

### ***Measures for improvement of the medical personnel labour conditions***

- planning of architectural solution of the medical institutions, the base of this solution are the building norms and rules
- creation of the optimal microclimate conditions in separate functional premises of hospitals, natural and artificial lightning, sanitary appliance etc.
- Personal protective equipment of body, eyes and respiratory organs are widely used.
- In order to keep health of medical personnel with harmful labour conditions, the legislation establishes the half day:
  - 4-hour-day – for medical workers directly connected with the bare radionuclides;
  - 5-hour-day – for personnel connected with sealed sources of the ionizing radiation
  - 5.5-hour-day – for doctors of the tuberculosis, psycho-neurological centers, physiotherapists, dentists;
  - 6-hour-day – at the infectious, tuberculosis, psychiatric, narcological, balneal, radon, laboratory departments.
- The leading position in the system of medical personnel health care is occupied by preventive and periodical medical examinations

## **6. Literature**

### **6.1. Principal:**

6.1.1. Общая гигиена. Пропедевтика гигиены. Учебник. / Е.И.Гончарук, Ю.И.Кундиев, В.Г.Бардов и др. – К.: Вища школа, 2000. – С. 242-307, 333-344, 397-416, 428-458, 488-511, 593-624.

6.1.2. Даценко І.І., Габович Р.Д.. Профілактична медицина. Загальна гігієна з основами екології. Навчальний посібник. – К.: Здоров'я, 1999. – С.3-34, 437-566.

6.1.3. Габович Р.Д., Познанский С.С., Шахбазян Г.Х. Гигиена. – К., 1984. – С. 189 – 242.

6.1.4. Загальна гігієна. Посібник до практичних занять. / І.І.Даценко, О.Б.Денисюк, С.Л.Долошицький. / За ред. І.І.Даценко. – Львів, 1992. – С. 170-220.

6.1.5. Lecture materials on the subject.

### **6.2. Additional:**

6.2.1. Гігієна праці. Підручник. / А.М.Шевченко, О.П.Яворовський, Г.О.Гончарук та ін. / За ред. А.М.Шевченка. – К.: Інфотекс, 2000. – 608с.

6.2.2. Руководство к практическим занятиям по гигиене труда. / Под ред. А.М.Шевченко. – К., 1986. – 336с.

## ***NEW REFERENCES***

1. Hygiene and ecology: textbook for students of higher medical educational establishments / under the editorship of corresponding member of NAMS of Ukraine, prof. Bardov V.G. – Vinnytsia: Nova Knyha, 2009. – 688 p.
2. Hygiene and ecology / V.A. Korobchanskiy, M.P. Vorontsov, A.A. Musulbas. – Kharkov, 2006. – 207 p.
3. Medicine of emergency situations: textbook for students of higher medical institutions / V.V. Chaplyk, P.V. Oliynyk, S.T. Omelchuk, V.V. Humenyuk. – Vinnytsia: Nova Knyha, 2012. – 344 p.
4. General nutrition: Study guide for the 4<sup>th</sup> accreditation level Medical School Students / edited by S.T. Omelchuk, O.V. Kuzminska. – Kyiv, 2016. – 146 p.
5. Гигиена и экология: учебник для студентов высших медицинских учебных заведений. – Винница: НОВА КНИГА, 2008ю – 720 с.

## **7. Equipment required for the lesson**

1. The Law of Ukraine «On provision of sanitary and epidemic safety of the population» from 24.02.1994.
2. Labour Protection Law of Ukraine No 64 from 1993.
3. Extracts from Labour Code (LC).
4. Extracts from legal acts, rules and instructions.
5. Dangerous industrial hazards (Extract from State Standard 12.0.003-74).
6. List of toils and works in dangerous and hazardous working conditions, where the involvement of women and adolescents is forbidden. (Order of the Ministry of Public Health of Ukraine No 51/260 from 1994).
7. Regulation on Medical and sanitary centers (MSC) and Medical stations of industrial enterprises.
8. Legislative documentation that regulates work of MSC, MSCE, MCC, MLCE.  
(Order of Ministry of Public Health of Ukraine: “List of works that require additional occupational take on”; “Regulation on medical examination of workers of certain categories”; “On improvement of medical care of workers of industry, construction and transport”; “On cooperation of enterprises (association), organizations, institutions and sanitary epidemiological stations in laboratory (SES) monitoring of working conditions” etc.).
9. List of occupational diseases (MPH, MFA and ML. Order № 23 (36/9)).
10. Situational tasks Krok-2.
11. State examination situational tasks.

