

REVIEW ARTICLE
PRACA POGLĄDOWA

OVERVIEW AND ANALYSIS OF OCCUPATIONAL RISKS IN HEALTHCARE OF EASTERN EUROPE COUNTRIES

DOI: 10.36740/WLek201912219

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ABSTRACT

Introduction: Occupational risks affecting each healthcare professional are diverse and significantly affect their physical and psychological condition. They can conditionally be divided into risks resulting from: 1) the impact of the work process and pose a risk to the life and health of healthcare professionals; 2) the activities of healthcare professionals and pose a potential risk to the patients lives and health. The latter group poses a threat of criminal liability for the healthcare professional. It is the task of each state to ensure safe working conditions for the effective performance of their duties by healthcare specialists. However, according to the study, the analyzed Eastern European countries lack accurate statistics on occupational diseases of healthcare professionals, while the latter often do not seek specialized care and are treated on their own.

The aim: to identify the types and causes of occupational risks for healthcare professionals working in the countries of Eastern Europe; to investigate the legislation of these countries under which medical professionals may be prosecuted/held guilty and, thus, criminally liable for causing harm to their patients.

Materials and methods: Legislation of the Republic of Belarus, Republic of Moldova, Russian Federation and Ukraine, international declarations and conventions, research papers, case law of the European Court of Human Rights, national court decisions of some East European countries.

Conclusions: Occupational risks to the healthcare professionals are risks to his or her life and health and risks of criminal liability for causing harm to the patient. The causes of the first type risk are: a significant prevalence proportion of infectious diseases; the use of faulty medical equipment; unregulated working day and low salaries; medical attendance of patients prone to aggression, etc. The healthcare professional shall be criminally responsible only if he/she is found guilty for infliction of harm to the life and health of the patient and the presence of the obligatory signs of a specific crime in his/her actions.

KEY WORDS: medical workers, professional risk, occupational disease, infectious disease, the responsibility

Wiad Lek 2019, 72, 12 cz. II, 2510-2517

INTRODUCTION

Professional risk is a multifaceted and complex phenomenon that has different aspects and levels of manifestation. Among the most occupational risky areas, medicine is rightly identified, noting that physicians 'are employed to diagnose our ills (take a risk, for they might be wrong), decide on treatments (e.g. particular pills and dosages) and make many other decisions (e.g. decide when it is appropriate to discharge patients)', as well as nurses, 'who have to make judgments, also known as 'risk decisions, irrespective of their specialty, level or experience' [1, p. 9]. Occupational (clinical) healthcare risks should be understood to mean risks arising directly from the delivery of medical care [2, p. 11]. By contacting infectious patients and their sometimes aggressive relatives on a daily basis, a healthcare professional is at risk not only of becoming ill, but also of being offended, beaten, etc. Harmful factors in the work process of a healthcare worker, which negatively affect his body, as well as the process of saving the life and health of another person, lead to the fact that healthcare is a 'double-edged sword', which poses risks for the life and health of both the patient and the healthcare professional.

And if too much research is devoted to patient risk, the other topic is often overlooked.

THE AIM

The purpose of this study is to identify the types of occupational risks for healthcare professionals working in the countries of the Eastern Europe, the causes of their occurrence, the study of the legislative system of these countries, according to which healthcare professionals may be prosecuted/not prosecuted for harming their patients and court practice in this area.

MATERIALS AND METHODS

This research is based on Belarusian, Moldavian, Russian and Ukrainian regulations, ECHR decisions, research papers. In addition, the statistics of the World Health Organization (WHO), the National Institute for Occupational Safety and Health, the statistical data of the state institutions of Belarus, Moldova, Russia and Ukraine, 50 sentences from the national courts practice of Ukraine and

Russian Federation have been used, as well as doctrinal ideas and views on this issue.

The article is based on dialectical, comparative, analytical, synthetic, statistical and complex research methods.

REVIEW AND DISCUSSION

The field of healthcare assistance and medical services is extremely important to ensure the life activity of any person and society as a whole. At the same time, this area is associated with continuing professional risks. 'Healthcare workers face a wide range of occupational hazards, including sharps injuries, harmful exposures to chemicals and dangerous drugs, back injuries, latex allergy, violence, and stress. Although it is possible to prevent or reduce healthcare workers' exposure to these hazards, healthcare workers continue to experience injuries and illnesses at the workplace. Cases of healthcare workers' nonfatal occupational injury and illness are among the highest in any industry sector'¹ [3].

It should be noted that in the contemporary scientific literature, the concept of 'occupational risk' in healthcare is usually used in two meanings. Some researches attribute the occupational risk of a healthcare professional to circumstances that exclude crime. Other researchers view occupational risk as a detrimental effect of adverse labour conditions on the health of a healthcare professional, which sometimes leads to his/her disability or temporary disability [1; 4]. In other words, the causes of occupational diseases of physicians, their types and means of prevention are investigated. All risks encountered by healthcare professionals are also grouped by different criteria. Thus, N. Ulutasdemir, F. Tanir state: 'The health-related risks associated with health professionals can be grouped by psychosocial, physical, biological, chemical and ergonomic factors. The American National Institute for Occupational Safety and Health has reported 29 types of physical, 25 types of chemical, biological 24 varieties, 10 and six types of ergonomic and psycho social hazards and risks' [4]. There are other classifications of occupational health risks.

To achieve the goals of our article, we suggest subdividing risks into 2 main groups: 1 - occupational risks caused by the impact of the work process and posing a risk to the lives and health of healthcare professionals; 2 - the risks of criminal liability of a healthcare professional for causing harm to patient's life and health.

We will investigate the above mentioned risk groups in more detail in the territories of Eastern European countries such as the Republic of Belarus (hereinafter - the RB), the Republic of Moldova (hereinafter - the RM), the Russian Federation (hereinafter - the RF) and Ukraine.

1. Occupational risks that are caused by the impact of the work process and posing a risk to healthcare

professionals live and health. This group of risks is nothing but healthcare professionals running the risks of occupational diseases and of violence by patients and other persons. In accordance with the Report of 2002 to the Occupational Safety and Health Convention, 22.06.1981, No. 155, the term 'occupational disease' covers any disease contracted as a result of an exposure to risk factors arising from work activity.

Subject to the nature of the working process conditions that adversely affect the life and health of a healthcare professional, we propose to subdivide these risks into: 1.1. Threats to infect an employee involved in care of patients with infectious diseases. 1.2. Threats of physical abuse by patients/their representatives or by third parties. 1.3. Threats to psychological health associated with working in conditions of increased responsibility and psycho-emotional stress. 1.4. Health hazards for a healthcare professional due to both adverse working conditions and health equipment shortages. Our classification does not claim to be logically complete, because it is sufficiently conditional, as the risks often complement each other.

1.1. *Threats of contracting an infectious disease by a healthcare professional involved in the care of patients with infectious diseases.* The official statistics on the incidence of infectious diseases in the population of Eastern Europe, as noted by the absolute number of researchers, do not coincide with the real indicators for a number of reasons. Therefore, a healthcare professional is constantly at risk of contracting an infection.

Thus, according to the WHO official data, in 2017, 10 million people contracted tuberculosis (hereinafter TB) and 1.6 million died from the disease [5]. In the RM the global TB incidence in 2017 totaled 83.3 per 100 thousand population, in Ukraine - 63.9 per 100 thousand, in the Russian Federation - 48.3 per 100 thousand, while in the RB - 24.3 per 100 thousand [6; 7, p. 29; 8; 9, p. 182]. Thus, in Ukraine TB is consistently ranked 1st in the structure of occupational diseases among healthcare professionals (87.7% on average over 15 years) [10, p. 12]. A similar situation is observed in Russia, where respiratory TB is the main disease among medical professionals and its annual rate exceeds 80% [11, p. 158]. It is interesting to note that occupational TB incidence in the RB tends to decrease: in 2016 compared to 2010, the number of health workers who contracted this disease dropped from 94 to 56 people [12, 121]. Statistics show that there is no incidence of TB among medical workers in RM [13].² Although any healthcare professional working in general health care facilities runs a risk of occupational TB infection, healthcare professionals working at anti-TB facilities are referred to the highest

¹ Healthcare professionals face a wide range of hazards at work (injuries, chemicals, drugs, back injuries, latex allergy, violence and stress, etc.). Cases of occupational injuries and non-fatal illnesses among healthcare professionals are among the highest in any industry [3].

² This situation, according to Moldovan researchers, can be explained by the fact that in the RM they generally do not recognize such cases as occupational diseases. In addition, there is no possibility to recognize professional disease even through legal actions [14]. So we can talk about the lack of proper accounting.

risk group. For example, in Ukraine this group accounts for 70-95% of cases annually. Most often these are: nurses - 37.9%, doctors - 13.7%, paramedics - 5.6%, laboratory assistants and hospital attendants - 6.5%. There are also individual cases of infection among medical endoscopists, radiologists [10, pp. 8, 13; 15]. A medical worker may contract TB through contact with an infectious patients or infected materials.

An exceptional threat to human life and health are such viral infections like HIV/AIDS, B and C hepatitis. These nosological forms are next to the threat to human life and health. According to the WHO data as of 2017, approximately 325 million people worldwide are living with chronic B hepatitis (HBV) or C hepatitis (HCV) [16]. The prevalence of this infection in Eastern Europe is quite significant, although there is a tendency of its gradual reduction. As early as 2017, HBV/HCV incidence rates were as follows: in Belarus - 3.2 (overall); in Moldova - 0.57/1.32; in Russia - 9.57/34.63; in Ukraine - 3.54/122.7 per 100 thousand population [9, 180; 11, p. 132; 17; 18, p. 26; 19, p. 18]. However, these indicators are exceeding those of other European countries.

The risk of contracting these types of infections includes physicians who are in immediate contact with patients' blood: surgeons, dentists, resuscitators, obstetricians, physicians of hemodialysis units, laboratory assistants, operating and procedural nurses. Pathways for HBV and HCV contracting are hematogenic (through blood), using non-sterile needles or other carelessly disinfected medical tools, and contact one - during direct contact of the employee's mucous membranes with the fluids of patients or infected persons. It is interesting that the share of viral hepatitis in 2012-2017 in the Russian Federation accounted for 3.4-11.5% of health workers cases of occupational diseases (2017 - 9.86%) [11, p. 158]. However, one can claim there is statistical latency of this disease among physicians and nursing staff in all the countries studied which is due to the peculiarities of the clinical course of this infectious disease, which can be asymptomatic for a long time.

According to the WHO European Regional Office, 130,861 new HIV patients were identified in Eastern Europe in 2017, of which 104,402 were in Russia. According to experts, in the Russian Federation there are 71.1 HIV patients per 100 thousand people. Ukraine accounts for 37 cases, the Republic of Belarus - 26.1 and the Republic of Moldova - 20.6 [20, p. 42]. However, official data does not reflect the true scale of the epidemic, as information is available on the number of people who have been tested for HIV antibodies only and who have been detected as infected. In fact, the number of infected persons is much higher and they are not aware of their status, since for some time HIV infection may be asymptomatic [21, pp. 23-24]. That is, it is not difficult to imagine how often healthcare workers are exposed to the risk of infection, especially during occupational injuries (for example, when a health worker is injured with non-sterile needles after manipulation, with ampoules, cutting or piercing tools) or

through direct contact of health workers with the mucous membranes of AIDS patients and HIV-infected individuals not receiving antiretroviral therapy. Nurses working in hospitals rendering assistance to HIV-infected individuals and in outpatient care units, as well as ambulance health workers are most often exposed to risk of occupational HIV disease. Surgeons, operating nurses and gynecologists also belong to higher risk group. However, official statistics operates with extremely low indexes. Thus, 'in Ukraine in 1987-2013, there were officially registered 3 cases of occupational HIV infection of healthcare workers (before 1997 - 1 case, in 2004 - 1, in 2005 - 1), which is 2.1 per 100 thousand of the relevant professional group' [22, p. 9]. The situation in other countries of Eastern Europe is even worse. For the period 2010-2017, there is no known case of recognition of health workers incidence working in Russia, Belarus or Moldova contracting HIV infection as an occupational disease. According to the researchers, this may be explained by the difficulties that arise in proving the fact that the contracting of HIV infection by a healthcare professional occurred as a result of their professional duties [22, p. 9], as well as the legal insecurity of such a worker by the state. A doctor with such a diagnosis is unlikely to remain at work. Employers do not take into account the fact that a significant number of patients who are treated daily by healthcare providers have a hidden HIV diagnosis. An HIV-infected doctor not receiving antiretroviral therapy is considered to be a threat to his patient, not the other way around.

Medical workers also suffer from hospital-acquired infections (pneumonia, purulent, acute intestinal infections, etc.). Thus, in the departments of purulent surgery, 63% of the medical staff each year suffer from purulent-inflammatory infections [23, p. 32]. They face daily (especially ambulances, therapists and pediatricians, otolaryngologists and dentists, etc.) and SARS, herpes, especially type I and II, staphylococcal and streptococcal infections, fungal lesions, etc. But there is no statistical accounting of medical personnel getting infected with these pathogens.

1.2. Threats of physical abuse by patients/their representatives or by third parties. In recent years, the Eastern European medical community has been concerned about the annual increase in the number of attacks on health workers. Thus, according to the official data of the Ministry of Health (hereinafter - the MOH) of Ukraine from 2013 to 2017, the total number of reported infringement on life and health of medical workers of the emergency medical care system alone, was 543 cases, 2 of them led to disability and 3 - to the fatal outcome [24]. In 2018 alone, 152 attacks on health workers were reported by the MOH press service in Ukraine [25]. The Ministry of Health of the Russian Federation also reported that in 2010-2016, there were registered about 1,226 attacks on health workers in the course of their duties. In 2016, a tendency of increase in the number of assaults was observed [26]. The situation in Belarus and Moldova is not much better, however,

official statistics of this type of offenses is not kept there [27]. In addition, there is every reason to believe that the figures are significantly underreported, as health professionals often do not turn to law enforcement authorities. Case law analysis shows that they are most often inflicted injuries of varying degrees of severity and they are subject to assaults with the purpose of drugs seizure [28]. Quite often, such acts are performed by patients who are prone to aggression (intoxicated [29], under the influence of drugs or other psychotropic substances, and persons who have already served their sentences in prisons or the mentally ill persons). Emergency medical team doctors and duty doctors in the reception units of medical institutions are at high risk. There are individual cases of harming nursing health. For example, a citizen of Ukraine was convicted for a set of crimes under Part 1 of Art. 122 of the Criminal Code of Ukraine (intentional moderate bodily harm) and Part 1 of Art. 296 of the Criminal Code of Ukraine (hooliganism), for being in the reception room of the children's clinical hospital, he broke the window of pediatric seat, causing the nurse slight bodily injury, and unreasonably struck a doctor in the face who ran out of the office on hearing the noise, inflicting him moderate bodily harm [30]. There is also a tendency of the increase in the number of attacks on emergency medical teams on the streets of Eastern Europe. In particular, conflicts over parking space, when entering/leaving an ambulance, are not uncommon. Owners of private cars can start a fight not only with the drivers of the ambulance, but also with its medical staff [31]. There are several reasons for the situation that has taken shape, in our opinion: 1) the decline of the authority of the health worker (the population begins to treat them as a staff, considers them to be corrupt, blames the inability to effectively and cheaply cure the patient). At the same time, not only patients but also their relatives or even outsiders behave aggressively; 2) understaffing of ambulance teams and as a consequence – their physical insecurity; 3) low salary level, unregulated working day, which makes it impossible to treat a patient in attentive and caring manner; 4) permanent impoverishment, loss of cultural values of the population increases its aggressiveness.

1.3. *Threats to psychological health associated with working in conditions of increased responsibility and psycho-emotional stress.* In Eastern Europe, the work of a healthcare professional is associated with constant stress. If we consider the unregulated working day, high physical activity and emotional exhaustion, low salaries, it is not surprising that the medical worker often has signs of a symptom of 'mental burnout'. The effects of the syndrome affect both mental and physical health as well as the quality of life and the effectiveness of a physician's work, which can cause a loss of professional competence. Alcohol abuse is often a way to overcome the stress. It is claimed that

5-7% of physicians have a severe form of alcoholism. According to the academician of the RAMS P. Sidorov, only 10-12% of doctors do not use strong drinks in the Russian Federation. And researchers at the Mayo Clinic (USA) found a link between educational level, occupation, and risk of Parkinson's disease: the average lifetime probability of the disease is 2%, but only 1% for people engaged in physical work. For physicians, the index is 4%! [32].

1.4. *Health hazards for the healthcare professional are associated both with adverse working conditions and health equipment shortages.* Among the diseases of healthcare professionals in Belarus, Ukraine and Russia, the 2nd and 3rd places share allergies, intoxication and diseases of the musculoskeletal system [10, p. 12; 33, p. 70]. We do not provide relevant percentages, as official statistics is not publicly available (except Russia). However, the literature sources note that 'occupational allergy accounts for 22.6% of the total number of diseases in healthcare professionals. One of its common manifestations is bronchial asthma. It is followed by allergies to medicines and skin diseases' [32].

Separately, it is worth to note that technologies used in medicine and increasing opportunities for diagnosing and treatment are also dangerous. An example of this could be the accident that occurred in the intensive care unit of the city hospital in Lugansk city (Ukraine) caused by the explosion of an oxygen-air balloon which resulted in the death of 16 people, 4 of whom were health workers [34]. The health of medical staff in operating theaters and biochemical laboratories is adversely affected by chemicals (halothane, acetic acid, formaldehyde, phenol, ammonia, oxygen chloride), the concentration of which often exceeds the permissible limit. Ionizing radiation, which can cause leukemia, skin tumors in radiology laboratories, radiotherapy departments, surgeons of radiological teams, occupies a special place among the physical factors that pose a risk to the health of healthcare workers. On the background of contemporary knowledge about radiological protection it becomes especially hazardous when using malfunctioning equipment, or equipment with expired operation life, during emergency situations.

2. *The risks of criminal liability of a healthcare professional for causing harm to a patient's life and health.* Receiving medical care/services, despite all current protection measures, the patient is also exposed to risk. Many of them are inherent to therapeutic and diagnostic activities, and it is almost impossible to get rid of them. But at the same time, the risk-benefit ratio should be optimized, while minimizing the first one to provide the expected level of care (service). Usually, the likelihood of adverse effects increases with surgery, therapeutic treatment, blood transfusion or blood donation, during medical experiments and the like. As A.M. Serdyuk, states 'The magnitude of the harm to patients in the process of providing medical care is evidenced by the data given in the the Helsinki Declaration on

Patient Safety in Anesthesiology: annually around 230 million patients undergo anesthesia in major surgeries worldwide. These measures cause about 7 million severe postoperative complications, which in almost one million patients result in death (about 200,000 deaths in Europe)³ [35, p. 18]. Researchers also note that according to the WHO, an average of 8.4% of patients record hospital-acquired infections, which often cause their death. In general, their mortality rate is 10 times higher than in individuals without such infection [23, p. 32].

³ A separate risk group relates to adverse (undesirable) drug response (hereinafter referred to as ADR). According to epidemiological studies conducted in many countries, there is a predominance of predictable (dose-dependent) responses (75–80% of all ADR). For example, in Ukraine, ADR B type ('bizarre', that is, unpredictable, dose-independent responses) occur in 40% of cases. 36–47% of all ADR cases report serious in-hospital reactions depending on the department profile, with 73% of incidents requiring hospitalization or its continuation (1.8–1.9% of ADR resulted in patient death) [36, p. 75-77]. Therefore, the most common negative consequences for a patient with medical intervention are infection, complication of the existing disease or/and his/her death. In such circumstances, the issue of criminal liability of a medical professional arises. That is, the negative consequences are borne by the both parties. But the opinion of those researchers who claim that healthcare workers are often criminally prosecuted seems to be groundless [37].

In particular, in order to prosecute a medical professional, it is necessary, at first, to exclude a possibility of the presence of a justifiable medical error, an extreme necessity, a risk related act (justifiable risk) and a casus (fortuitous event). And secondly, to establish and prove a number of mandatory signs of a specific crime, which is seen in the actions of a person.

So, let us consider the first part of the circumstances, which exclude the possibility of criminal prosecution. A medical error is excusable if a healthcare professional, due to his/her careful and conscientious attitude to the work, could not avoid the errors due to some objective and/or subjective reasons.⁴

Urgent need, based on criminal law, means of causing harm to the lawful interests in order to eliminate a danger directly threatening a person or a person's or other persons' rights protected by law, as well as public or national interests

if this danger could not be eliminated by other means in these circumstances and if there was no exceeding the limits of extreme necessity herewith.⁵ This circumstance, which eliminates the crime of action, occurs in the conditions of the ambulance (urgent medical care), when the actions of health workers are aimed at eliminating the danger that directly threatens the person at the moment. For example, in situations of anaphylactic, traumatic shock, hypertensive crisis, clinical death, snakebite, angioneurotic edema, etc. In particular, proper performance of indirect cardiac massage leads to fracture of the patient's ribs. A more difficult option is a situation when a pregnant woman is delivered unconscious to a physician but with great blood loss. In these circumstances, if the fetus threatens the life and health of the woman, a physician will save the latter, performing an induced pregnancy termination.

Therefore, in order to exclude the possibility of criminal prosecution, it is necessary that: 1) the danger should be real; 2) the situation should require emergency medical assistance, which would cause harm to a patient's health; 3) the non-infliction of this harm should threaten with more serious consequences for the patient's health or even life; 4) it should not be possible to eliminate the danger under the conditions.

Risk-related action (justifiable risk) takes place in situations where socially dangerous consequences are the result of actions taken by a healthcare professional to achieve a meaningful socially beneficial purpose⁶. In this case, such actions will be considered valid only if the following conditions are met: 1) the harm was caused in order to achieve a significant socially beneficial purpose: for the sake of saving human life and health or developing medicine; 2) this goal cannot be achieved by traditional means. If help could be rendered in a traditional, non-risk-based way, then such actions are considered criminal; 3) the healthcare professional has taken all possible actions to prevent potential harm to the patient's life and health; 4) the patient is fully aware of the likelihood of adverse effects and voluntarily consented to the risky actions. The latter condition is particularly separately emphasized by Art. 5 of Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine (ETS-164) 1997 [39].⁷ In addition, it also provides for a situation where the patient is unable to provide such consent due to being under age, incapacity or inability to give his/her consent for health reasons (Articles 6, 7 of the Convention, etc.). Although the said Convention does not contain a direct indication of the possibility of the protection of violated rights and freedoms

³ Newborns are most affected by hospital-acquired infections. Thus, in 8 regions of the former CIS, the mortality from nosocomial infections at neonatal pathology units reaches 46.6% among the newly born babies. 21,9% of the operated children of the older age who stay in surgical hospitals, develop contracted intra-hospital infections. Also quite high rates are observed among adult patients (15–36% among women in labor and patients in surgical departments) [23, 32].

⁴ See more in detail 'Medical Error and Liability for It in Some Post-Soviet Countries (Belarus, Kazakhstan, Moldova, Ukraine)' [38].

⁵ Art. 36 of the Criminal Code (hereinafter, the CC) of RB, Art. 39 of the CC of RF, Art. 38 of the CC of RM, Art. 39 of the CC of Ukraine.

⁶ Art. 96 of the CC of RB, Art. 41 of the CC of RF, Art. 40 of the CC of RM, Art. 42 of the CC of Ukraine.

⁷ As of February, 2019 The Convention on Biomedicine was signed and ratified by 29 states (including the Republic of Moldova), and 6 – signed it only (Ukraine among them). Belarus and Russia did not even sign it [39].

in the European Court of Human Rights (hereinafter referred to as ECHR), and the applicant cannot justify his/her claims by referring only directly to it, the Court itself has repeatedly referred to its rules in order to hear cases of violation of the Convention for the Protection of Human Rights and Fundamental Freedoms of 1950 or to protect biomedical human rights under Art. 2, 3, 6 and 8 of the 1950 Convention⁸. For example, in the case of 'Glass v. UK', the Court heard the case on the violation of the right to respect for privacy, namely consent to medical intervention. It stated that the decision to treat, when it contradicts the position of the patient (or his/her legal representative), indicates that there is an interference with the right to respect for his/her private life and his/her right to physical integrity. It was also noted that consent should be voluntary, clearly expressed and informed [40].

It should also be noted that the occupation of a physician is associated with the need to experiment at times. The ability to use new methods, treatments and diagnostics, new drugs without fear of criminal prosecution is an important factor for the healthcare system development. Nowadays, there are often reports on designing new devices, implants, performing new surgeries, etc.⁹. The world is changing rapidly, the dynamics of the development of science and the emergence of new inventions are very fast indeed. WHO, as well as individual states, often have lack of time for relevant response and checking everything for safety. A striking example of this could be a study conducted in Germany and Switzerland. According to the data obtained, 2/3 of the 40 tested nanoproduct manufacturing companies did not assess occupational risks for workers involved in production and the risks of causing potential harm to their consumers [41]. Instead, the legislation of the countries under analysis usually contains only outdated national programs that require intensive development of nanotechnology research and development.¹⁰

At the same time, reports of illegal medical studies (experiments) appear periodically in online publications, especially regarding trials of new medications [42]. However, only in the Criminal Code of Ukraine there is a special regulation (Art. 142) on the illegal conduct of experiments on a person, but according to the Unified State Register of Judgments of Ukraine, currently, there are no sentences passed and served for this crime.

It is also necessary to exclude the likelihood of a *casus (accident)* characterized by a lack of guilt of a healthcare professional. The most common causes of *casus* in healthcare are atypical disease due to individual features of the human body, unusual anatomical structure, congenital anomalies, allergic reactions to diagnostic manipulations and medications. The latter becomes more relevant and widespread, in particular, physicians witness a steady increase in allergic reactions, as described above.

Only after the exclusion of the existence of these circumstances, lawyers can raise the question of the liability of a healthcare professional for the so-called 'Medical crimes'¹¹.

Therefore, the risks that are caused by the activities of healthcare professionals and which pose a potential risk to the life and health of a patient, can lead to criminal liability of a healthcare professional. Therefore, adherence to the conditions put forward by the international community is not only able to protect the patient's life and health, but also to safeguard it.

CONCLUSIONS

Occupational healthcare risks should be considered as risks to the health and safety of a healthcare professional himself/herself, and as the risk of criminal liability for causing harm to a patient's life and health. The causes of occupational risks that cause harm to the life and health of a healthcare professional are: the high prevalence of infectious diseases; the use of faulty medical equipment or equipment whose service life has expired; unregulated working day, emotional exhaustion and low salaries; attending patients who are prone to aggression (including drug addicts, alcoholics, mentally ill persons) and dissatisfied with the scope of medical services, etc. The issue of criminal liability of a healthcare professional arises because of the negative consequences for the life and health of a patient and the presence of obligatory signs of a specific crime in a person's actions. In this case, a medical excuse should be excluded, a *casus*, an emergency condition, or a justified risk.

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⁸ Examples include these decisions: 'Vo v. France' (Application No. 53924/00), 'Evans v. United Kingdom' (Application No.6339/05), 'Juhnke v. Turkey' (Application No. 52515/99), 'V.C. v. Slovakia' (Application No. 18968/07), 'Josef Prinz v. Austria' (Application No. 23867/94), 'Roche v. UK' (Application No. 32555/96) and other.

⁹ The achievements of nanomedicine are particularly striking. It provides unique opportunities for penetration into cell membranes, allows to localize the use of a number of narcotic and toxic drugs in individual organs and systems, for more effective and safer treatment of HIV/AIDS, cancer and other diseases. A separate niche of opportunities – diagnosticating of diseases. The pace of research in nanocompatible drug delivery systems and diagnosticating tests is increasing, which will enhance physicians' capabilities greatly. Today, already, more than 10 names of nanomaterials that are part of medicines are actively used, in particular, for the treatment of cancer, osteoporosis and appetite suppression [41].

¹⁰ In Ukraine, this is the State Target Scientific and Technical Program 'Nanotechnologies and Nanomaterials' for the period 2010-2014, in Russia – 'Program for Development of the Nanoindustry in the Russian Federation to 2015'. Only in Belarus, the President, on April 22, 2015, issued Decree No. 166 'On Priority Areas of Scientific and Technical Activity in the Republic of Belarus for the period 2016-2020'.

¹¹ In particular, these are Articles 156-158, 161-164, 178, 184, 335 of the Criminal Code of Belarus, Articles 144, 158-163, 169, 211-214 of the Criminal Code of Moldova, Articles 120-124, 128, 235 of the Criminal Code of Russia, Articles 131-134, 138-145, 151 of the Criminal Code of Ukraine.

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According to the order of the Authorship.

Conflict of interest:

The Authors declare no conflict of interest.

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Received: 10.09.2019

Accepted: 22.11.2019