

Aliexsieienko Iryna,

Doctor of Political Sciences, Professor, Head
of the Department,

Dnipropetrovsk State University of Internal
Affairs, Dnipropetrovsk, Ukraine

ORCID ID 0000-0002-6873-003

STATE NATIONAL SECURITY IN THE FACE OF THE THREAT OF BIOTERRORISM: STRATEGY OF COUNTERACTION

Nowadays the threat of being a victim of a terrorist act or feeling psychological pressure from terrorists applies to everyone, regardless of age, gender, nationality or social status. Bioterrorism, as a new type of terrorism, has already ceased to focus on individuals. The broad masses are becoming the subject of its impact that causes huge human losses. All this actualized the need for a comprehensive scientific knowledge of the dynamics of the “bioterrorism” phenomenon, as well as the need to expand conceptual approaches to forecasting, preventing and reducing its threats.

The study is based on the integrated analysis of natural science, medical social, sociopolitical and legal aspects. It highlights strategies to counter biological terrorism, opportunities that grow in parallel with the development biotechnology, molecular medicine, and gene engineering combined with the availability of appropriate information and materials.

Keywords: *bioterrorism, national security, biotechnology, biological threat, biological warfare, human security.*

Formulation of the problem. The modern world is becoming increasingly unpredictable in its development. Today the picture of the world is being changed under the influence of the powerful impact of nano- and biotechnologies, the evolution of molecular medicine, as well as the threats and challenges of

globalization, in particular, terrorism, and its new type, bioterrorism. Significant global transformations of political, economic, social and other spheres of state activity emphasize non-standard, complex political and legal research of the security institute, and in particular on epidemiological and biosecurity caused by bioterrorism threats, which articulate the aim of this article.

When taking into the consideration the results of a comprehensive medical and social analysis of the use of molecular medicine achievements by terrorist organizations, and we points that bioterrorism is a new problem for national security of states.

Having analyzed the activities and evaluation given by WHO, and the points of view of epidemiological specialists this article shows that this type of terrorism contributes to the rapid activation of the artificially created epidemic process and the development of the epizootological process in the case of the use of biological weapons. Therefore, in the absence of evidence or data, it is difficult even to hypothetically predict the course of development of the epidemic process caused by one or another pathogen.

The purpose of the article. That is why, without assessing the degree of threat of modern bioterrorism, and predictive evaluation of its possible consequences, based both on scientific and empirical data, it is impracticable to discuss this problem and, moreover, develop effective programs to reduce possible negative social and economic losses from bioterrorist impact.

Analysis of publications where the solution of this problem has been started. For this study, the scientific works devoted to the study of the problems of using biological weapons as one of the weapons of mass destruction in military conflicts, as well as the activities of the international community to prevent and prohibit the means of mass destruction of people are also of importance. These questions were actively developed in the works of Russian scientists V.P. Abarenkov, V.N. Avilin, J.M. Amanzholov, A.G. Arbatov, O.V. Bogdanov, K.G. Borisov, P.I. Grishaiev, A.I. Yoirysh, A.A. Pikayev, G.A. Smirnov, P.M. Timerbaev, T.A. Fedorov, L.Ya. Cherkassky, M.G. Yanaieva and others.

However, the problem of bioterrorism as a complex problem has not been given due attention so far. Some aspects of the preventing activity against biological terrorism were touched upon in scientific monographs, articles, journalistic publications, practical manuals and other sources. Among authors, especially should be noted KB. Alibekov, E.P. Bazhanov, B.V. Boyev, E. Geisler, S. Goodman, P. B. Dolzhanov, V.I. Evstigneev, L.P. Zhiganov, K.-H. Kampa, Yu.P. Klyukin, B.P. Krasulin, G.V. Kovbasyuk, B.C. Kotlyar, I.A. Likholetova, E.V. Lukasevich, G. Lutai, V.P. Malyshev, P.A. Martynyuk, P.I. Melnichenko, M.L. Moody, V.F. Nemitsa, C.B. Netesov, M.A. Paltsev, G. Pearson, M.I. Postnik, P.S. Romashkin, J. Rotfeder, L.S. Sandakhchiev, A.A. Semenov, G.A. Smirnov, T. Stock, J. Tucker, T. Trevan, O. Traenta, Yu.M. Fedorov, E.H. Khramova, M. Shevriev, G.Ya. Shcherbakova.

Among the most interesting works devoted to the study of bioterrorism, the following works can be distinguished: Yu.A. Bobylov "Genetic bomb. Secret scenarios of bioterrorism"; V.G. Ovchinsky «Criminology and Biotechnology»; G.G. Onishchenko, «The Organization for the Elimination of the Health Consequences of Biological, Chemical, and Radiation Terrorist Acts»; G.G. Onishchenko, A.A. Shaposhnikov, V.G. Subbotin, G.P. Prostakishin, G.M. Avetisov «Ensuring biological, chemical and toxic-radiation safety during terrorist acts» and others.

Presenting main material. The study is based on the integrated analysis of natural science, medical social, sociopolitical and legal aspects. It highlights strategies to counter biological terrorism, opportunities that grow in parallel with the development biotechnology, molecular medicine, and gene engineering combined with the availability of appropriate information and materials.

Nowadays the threat of being a victim of a terrorist act or feeling psychological pressure from terrorists applies to everyone, regardless of age, gender, nationality or social status. Bioterrorism, as a new type of terrorism, has already ceased to focus on individuals. The broad masses are becoming the subject of its impact that causes huge human losses.

All this actualized the need for a comprehensive scientific knowledge of the dynamics of the “bioterrorism” phenomenon, as well as the need to expand conceptual approaches to forecasting, preventing and reducing its threats.

We emphasize that this is due to the fact that the principle of response, which functions in the event of a threat is presented in the form of a scheme: “challenge (danger, threat, risk) – answer – result – analysis of the result – correction of the answer”, has outlived itself as a source of understanding dynamics of processes and mechanisms of ensuring medical and social security both at the regional level and at the global scale.

The need to develop a strategy to prevent the conditions and factors determining the emergence of bioterrorism comes to the fore today.

Such research method as modeling can play an important role in this process. It is explained by the fact that the formalized model constructed with the help of the sociomedical analysis of the phenomenon under study and the computational experiments carried out with it allow us to estimate the influence of the initial factors on the simulated phenomenon.

Despite the fact that while constructing a mathematical model, some facts of the phenomenon under study are discarded as insignificant, it allows one to fully describe which is often impossible with the verbal model due to the complexity of medical and social phenomena, and their multifactorial nature.

We believe it is worth noting that in the study of bioterrorism, this method is the only one that allows to conduct experiments, which as a result can provide an opportunity to identify the main control parameters of the model, and, having used their analysis, to determine the optimal parameters of the mechanism of medical and social impact in order to reduce the threat of bioterrorism.

Biological terrorism in modern society qualifies: 1) as a real threat to commit these acts for the same purposes; 2) as the act of complicity in the commission of these acts as an organizer, co-perpetrator, instigator or accomplice; 3) as the preparation or attempt to commit these acts [4, p. 1013–1014]. Under certain conditions, bioterrorism can become a systemic destructive phenomenon, a science-

intensive counterweight that can provoke global changes and, ultimately, lead to a change in the geopolitical situation [5, p. 1180–1182].

In the era of globalization, bioterrorism, due to its reality and unpredictability, as well as due to the negative consequences of a medico-social nature, has become one of the most dangerous threats to humans. Bioterrorism is a new problem for epidemiology. From the point of view of epidemiologists, this type of terrorism contributes to the rapid activation of the artificially created epidemic process, as well as the development of the epizootiological process in the case of the use of biological weapons. Therefore, in the absence of real datum it is difficult even to hypothetically predict the course of development of the epidemic process caused one or another pathogen.

In the present conditions, many researchers are of the view that biological weapon represents the type of weapon of mass destruction, whose action is based on the use of the properties of pathogenic microorganisms and their metabolic products of [8]. The revolution that takes place in the field of biotechnology can lead to creating biological weapons, which in terms of affecting parameters are not inferior to nuclear weapon and are more flexible in its application.

Biological weapon because of its combat characteristics, the relative ease of access to its preparation by the terrorist organizations, ease of use, variability of algorithms used to commit acts of biological terrorism and their possible effects acts as the most likely instrument of committing acts of international terrorism among other types of weapons of mass destruction.

Therefore, without assessing the degree of threat of modern bioterrorism, predictive data of its possible consequences, based both on scientific and empirical data, it is impossible to discuss this problem and even more so develop effective programs to reduce possible negative social and economic losses from bioterrorism impact. This is an established point of view of many researchers [17], as well as the authors of this research.

The nature around us is an inexhaustible source of microorganisms, such as viruses, bacteria and fungi, causing diseases of humans, plants and animals. The World Health Organization (WHO) considers that infectious diseases are the second

leading cause of death and the first cause of premature death in the world. According to WHO estimates, every year 2 billion people suffer from infectious diseases, 17 million of whom die. There are 50,000 deaths per day are caused by infectious diseases and half of the world's population is at risk of endemic diseases [10, p. 513–514].

There are other reasons why biological agents may be preferable to terrorists. First of all, it is availability, ease of manufacture, ease of storage and transportation, as well as the possibility of hidden use. The threat of bioterrorism requires an extremely high level of public health readiness to detect the most dangerous agents and eliminate the consequences of their deliberate use.

According to WHO, around the world, the public health system is fighting against naturally occurring infections at the limit of its capabilities, and the additional bioterrorist threat may lead to the fact that this system will not be able to cope with it. The vulnerability of society to biological agents is mainly due to the fact that the health care system is not able at this stage to detect them in a timely manner and to take the necessary protection measures. According to WHO recommendations, in order to increase public health preparedness to repel a biological threat in a given country, efforts should be focused on training staff in a program that includes a limited, but well-chosen group of biological agents. This will create the necessary potential to combat a wider range of pathogens [12, p. 225–226].

The extent of the damage with the use of such weapons far exceeds the effects of a nuclear explosion. Their action can be hidden, prolonged in nature and cause mass casualties for a short period of time (for example, in case of spraying of anthrax spores, smallpox viruses, plague up to 5 million people in one week). The most vulnerable areas are the metro, shopping centers, stadiums, etc.

Recent events indicate the increasing frequency of attempts by terrorists to access and use biological components to realize their goals. So, according to Interpol, there are serious reasons to assume that they are ready to use biological and chemical weapons by the international terrorist organization Al Qaeda. This, in particular, is evidenced by the statements of its leaders about the "right to kill up to four million people."

The work on the creation of biological weapons was also claimed by the detained militants of another terrorist organization, Djema Islamiy. Documents found in the Philippines in 2003 indicated that its leadership was interested in acquiring chemical and biological weapons for terrorist attacks. To this should be added the mass psychosis in the USA in 2002, caused by mailing letters with anthrax disputes. Its consequence was the massive buying by Americans of antibiotics and personal protective equipment. The population of Great Britain was on the verge of panic in July 2007, when it became known that the terrorists who were preparing the bombings in London and Glasgow were working in the public health system. Each of them could gain access to various poisons and deadly viruses. [8, p. 959].

It can testify to the high degree of reality of the acts of bioterrorism. As the Interpol leadership notes, a bioterrorist attack is only a matter of time¹. It is obvious that the world is tragically unprepared for such a bioterrorist attack. A similar point of view is contained in the study «Project 2020», the US National Intelligence Council, which notes «the great interest of terrorists in acquiring chemical, biological, radiological and nuclear weapons». The greatest concern of the authors of this study is the possibility of acquiring biological warfare agents, the use of which can lead to mass casualties. According to scientists in the field of infectious diseases and immunology, Biological attack can bring any country to its knees, even the most developed. At the same time, no country in the world is ready to repel a bioterrorist attack.

The situation is aggravated by the fact that besides bioterrorism, the main sources of biological danger include: natural and genetically modified pathogens of infectious diseases; uncontrolled transboundary transfer and introduction of alien species, including genetically modified organisms and food derived from them; uncontrolled genetic engineering and gene therapy; technological activity; uncontrolled cloning of humans and animals.

All this proves that the problems of combating bioterrorism need to be solved in a single complex with such closely related problems as biological security and ensuring sanitary and epidemiological well-being [6, p. 2333].

At a meeting of experts on infectious diseases, held in 1999 at the Center for Infectious Disease Control of the USA, the previously compiled lists of potentially dangerous biological agents were reviewed and general selection criteria were developed for those that pose the greatest danger in a bioterrorist attack. About 40 biological agents (viruses or groups of viruses, bacteria, rickettsia, fungi and toxins) were selected and three categories A, B and C were formed, including agents according to the degree of significance of the threat to the civilian population [13, p. 1501–1503].

In 2002, this list was used by the National Institute of Allergy and Infectious Diseases, one of the leaders in the United States in the study of infectious agents during the development of short-term and long-term research plans to counter terrorism. Biological hazard assessment of agents terrorism against the civilian population was carried out according to the following criteria: High morbidity and mortality; Potential for direct transmission from person to person or through a carrier; Low infectious dose and high aerosol infectivity that can cause large outbreaks; Ability to contaminate food and water resources; Lack of specific diagnostic tests and / or effective treatment; Lack of safe and effective vaccines; Potential to cause fear among the population and medical workers; Potential for use as a biological weapon.

Agents categorized as A, pose the greatest threat to civilians. Their use can lead to mass casualties, and some of them, such as smallpox and plague, can jeopardize the functioning of the entire state. Variola virus is considered to be the most dangerous because of its pathogenic and epidemic properties [15]. Over the entire history of humanity, smallpox claimed about half a billion human lives; it is more than did wars and other epidemics combined.

Most of the measures currently being taken are aimed at protecting civilians specifically from agents belonging to category A. However, it must be remembered that ordinary microorganisms, such as Salmonella, Legionella, or the influenza virus, which can permanently damage the majority of the population, to undermine the economy of the state, can be used as biological weapons. Researchers came to this conclusion based on a study of five outbreaks of infectious diseases that have recently occurred in various countries. Sanitary-epidemiological services and health

authorities of these countries could not adequately respond to the sharp increase in the incidence [16, p. 117–118].

It is extremely dangerous that terrorists can use of “emerging infections” agents. According to experts, we know no more than a few percent of existing viruses and a slightly larger proportion of bacteria, and nature constantly creates new pathogens. In the past 40 years alone, more than 30 new infectious agents have been discovered and identified, including HIV, Marburg and Ebola viruses. For these diseases are not developed means of treatment and prevention. A number of emerging and re-emerging pathogens, such as West Nile virus, drug-resistant Streptococcus, Staphylococcus and Mycobacterium tuberculosis, can also be dangerous biological agents [9, p. 1394].

Chimeric organisms designed using simple genetic manipulations are also a significant threat. At a conference held in Belgium in November 2001, scientists concluded that an influenza pandemic can be caused by artificial means. According to Dr. R. Webster, Director of the WHO Collaborating Center for the Study of the Ecology of Influenza in Animals and Birds, terrorists may well initiate an outbreak of influenza. The possibilities of modern biotechnology make it possible to create an influenza virus of the type observed in 1919 and caused multi-million deaths worldwide [17]. In contrast to these threats, methods should be developed to identify such artificially created agents and also specific means for the prevention and treatment of the diseases they cause.

The WHO recommendations point out that methods for the detection of biological agents based on molecular technologies put into practice need to be more sensitive, quick and accurate. To ensure the proper level of preventive measures, new safe and effective vaccines created by modern biotechnology methods are needed.

The need for further development of biomedical research is also emphasized in the strategic plan developed by the National Institute of Allergy and Infectious Diseases of the United States after the events of September 2001. It is noted that the possibility of detecting and preventing infections as consequences of bioterrorist acts largely depends on the level of fundamental and applied biomedical research.

The United States has been preparing to counter bioterrorism since the mid-1990s. In June 1995, a secret directive of the President of the United States was issued, which provided for increasing the country's readiness in case of terrorist attacks, including biological ones. In May 1998, the development of a comprehensive bioterrorism strategy began.

In 2000 the Center for Infectious Disease Control of the USA publishes the National Strategic Plan for Preparedness for Action in Cases of Biological and Chemical Terrorism [18, p. 498]. The plan provides for the coordinated participation in the identification and elimination of incidents of more than ten different organizations.

The main sections of the plan: prevention, supervision, diagnostics of biological and chemical agents, taking measures to eliminate the incident, warning system and information support. It also include to train personnel, effective sanitary and epidemiological supervision and ensure the readiness of all participants to detect and eliminate the consequences of the possible use of chemical and biological agents.

The key point of the plan was the creation in the United States of a multi-level network of diagnostic laboratories for the rapid detection, identification and notification of the health services of territories, states, districts and cities of identified agents of biological and chemical nature. The plan is focused on the modernization of existing structures to combat infectious diseases, especially at the local level [2, p. 337].

The plans of the WHO and the Center for Infectious Disease Control of the United States propose measures aimed at improving the clinical base and training medical personnel. Physicians should be well aware of the current epidemic situation, know the potential biological agents and symptoms of infectious diseases, often different from naturally occurring diseases. They must master the means of treatment and ways to prevent epidemics. Particular attention is paid to the creation of a monitoring system for unusual cases of diseases.

In 2002, the Law on Bio-Terrorism was adopted in US, it was aimed at implementing the 10-year Bioshit program worth \$ 5.6 billion. In particular, it

covered to develop vaccines against Ebola and plague, which are not intended for general sale.

Since 2003 the US food security program has been valid. The program includes the establishment of a system to control disease outbreaks of domestic animals and crops, as well as the development of new drugs to treat their diseases. In addition, the US administration has prepared a program of action to eliminate the consequences of the use of biological weapons. Every year, the provisions of this program are specified to increase its funding [1, p. 42].

Thus, the draft budget of the United States for 2008 envisaged an increase in allocations to fight the bird flu pandemic by more than 80 million dollars. In addition, the draft budget provided for the allocation of 325 million dollars for the program to protect food and agriculture. Most of this amount has gone into improving the safety and security of US food resources. The remaining funds were spent on the creation of more effective vaccines for livestock, the improvement of the emergency warning system in agriculture.

In 2003, the US Department of Homeland Security created a bioterrorism threat monitoring service, under which a significant portion of air pollution monitoring stations were modified, so that they could detect the presence of bioterrorism in the air at an early stage.

Countering bioterrorism is also part of military programs. Since 2004, the Massachusetts Institute of Technology, together with the Ministry of Defense, has developed an early warning system. The basis of this system is the use of the Doppler radar of the US Army not only for the compilation of meteorological maps, but also for early warning of a biological or chemical attack from the air.

In 2007, in the United States, a revised action plan for bio-attacks was announced, which involved the purchase and development of drugs for anthrax, smallpox, and acute radiation syndrome. According to the plan, more than \$ 100 million were spent on vaccines against anthrax and smallpox. The cost of drugs for the treatment of acute radiation syndrome exceeded \$ 100 million. In addition, the plan included the development of antibiotics to combat plague and tularemia, as well as the purchase of tools for the prevention of dangerous diseases [7, p. 41].

In this context, the trend of expanding international scientific cooperation is clearly gaining momentum in order to develop means of protection against biological agents that can be used by bioterrorists, including the development of means of preventing, diagnosing, treating, and detecting possible cases of terrorist use of biological agents.

Appreciating very highly the role of the mentioned national and international efforts in the field of non-proliferation, strengthening trust and openness and combating bioterrorism, we want to make some recommendations:

1. When formulating plans to counter biological and chemical terrorism, one should be based on the recommendations of the World Health Organization (WHO) to strengthen national preparedness and effective response. At the same time, the national security sectors should provide warning of possible incidents, and the responsibility for response should be placed on the health, veterinary, food safety and water quality sectors.

2. For effective implementation of scientific programs, it is necessary to improve the controls of export regime, the exchange of strains and information in this area. At the same time, it is necessary to strengthen the control regime for a possible “leakage” of biological materials and technologies from the research sector. It is important to pay special attention to the «human factor». Uniform requirements should be adopted for the storage, record keeping and work with pathogens, as well as standards for biosafety and the provision of physical protection for work performed.

3. A nation must be prepared to detect and eliminate the consequences of an outbreak of any biological agent, including traditional and exotic species of microorganisms. Existing national systems of state epidemiological surveillance and control of infectious diseases should be able to detect, localize and eliminate an outbreak of an infectious disease, regardless of whether it is a consequence of the natural manifestation of a natural pathogen or the result of its deliberate use.

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