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*M.M. Baranovskyy, Doctor of Agricultural Sciences, Prof., A.O. Ukrainska*
*(National Aviation University, Ukraine)*

**Current state and approaches to biosecurity and bioterrorism prevention in aviation industry**

*Scientific data and literature sources analysis according bioterrorism in Ukraine and all over the world and measures of its prevention especially in aviation sphere was carried out. Approaches of biosecurity ensuring in aviation industry in pandemic conditions are described.*

Bioterrorism is the intentional release of biologic agents in order to cause disease or death among human population or food crops and livestock to terrorize a civilian population or manipulate the government [1].

Reasons of bioterrorism development and its danger involve such facts:

• biological weapons are more available;

• significant number of viruses and microorganisms have not yet been studied. In addition, new pathogens so-called "emerging infections" are constantly emerging;

• biological weapons are easy to manufacture, convenient for storage and transportation;

• biological weapons are difficult to detect;

• consequences of bioterrorism requires a large number of vaccines or antibiotics as well as possible necessity of quick new drug development [2].

The routes of entry of biological weapons into the human body are mainly of three basic types, by inhalation, by contact (via skin / mucous membrane) and by the gastrointestinal tract. Methods of delivery as well can be very diverse, via bomblets delivered, by aircrafts or by spraying of agents. Biological weapons according to CDC classification are subdivided into three categories, category A, B and C, correspondingly to the priority of the agents to pose a risk to the national security and the ease with which they can be disseminated [1].

There are already 3212 laboratories of microbiological profile in Ukraine, which constantly work with biological agents of II-IV groups of pathogenicity [3]. Due to its geographical location, Ukraine is considered as transit state as it was and remains a bridge between Europe and Asia, between the North and the South. On the other hand, such conditions create the higher demands for biosecurity maintenance as high passengers' traffic may induce the risk of bioterrorism-increased frequency [4].

Spreading of SARS Cov-19 and pandemic restriction that are closely connected to biosecurity possess huge impact on aviation industry. According to report of State Aviation Service of Ukraine in 2020 flights number was reduced in more than two times in comparison to 2019. Dynamics of passenger traffic by air transport of Ukraine is shown in diagram on fig.1. The largest reduction in the number of passengers carried by Ukrainian airlines was observed in international flights [5].

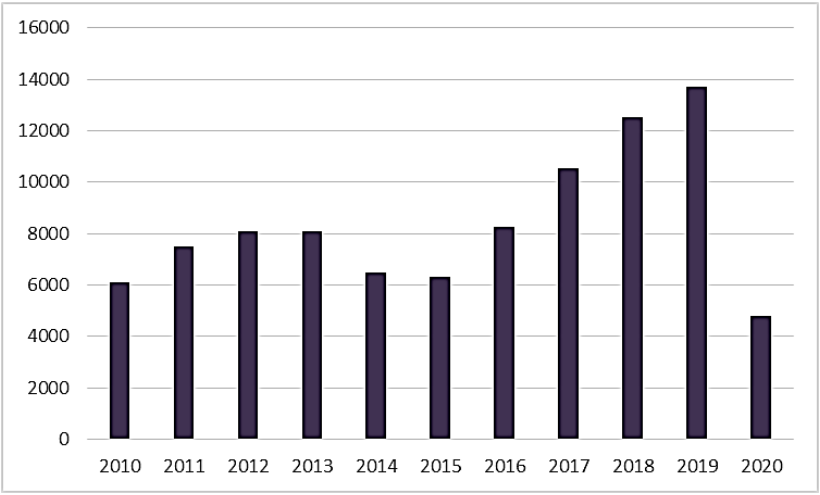

Fig.1 Dynamics of passenger air traffic

In April 2020, the State Aviation Service has developed, approved and posted on "Guidelines for air carriers to prevent the spread of coronavirus disease (COVID-19)". The Civil Aviation Service has joined the COVID-19 Response and Recovery Implementation Centre (CRRIC) to implement the recommendations and guidelines of the ICAO Council Aviation Recovery Taskforce [5.6].

The International Air Transport Association has proposed the special attempt for biosafety and biosecurity in aviation industry. They developed document “Roadmap for Restarting Aviation” in condition COVID-19 induced crisis. It states the basic requirements and guidelines necessary to implement on various stages of aviation industry work in order to provide the highest level of biosecurity and prevent possible bioterroristic activities or infectious agents spreading [6].

Biosecurity measures in pre-flight period should involve the control and monitoring of passengers by advanced collection of information that may be useful in terms of biosecurity insurance, for this purposes various electronic technologies are recommended to use or the special virtual platform containing collected data should be created [6].

In departure airport IATA propose to implement certain restriction, thus control the entrance of persons on the territory of airport, the temperature screening should be essential, as well the special reconstruction and marking of territory should be applied in order to minimize person interaction and to ensure the physical distancing between persons at least on level of 1-3 m. Also wearing of protective clothes for workers and masks for both passengers and workers is obvious as well as cleaning and sanitizing equipment within strictly defined time intervals. Also testing on Covid currently should be applied, based on express methods. In terms of quick science development, the complex express test on the most dangerous infection may be implemented soon that will be based on the applying of immunochromatographic test

strips. Also the possibility of immunity passport implementation is under consideration [6].

During the flight as well sanitizing, distancing, and mask wearing is obvious. Arrival airport should undergo the similar requirement in order to ensure of biosafety via achieving the maximal possible automatization and minimizing the person to person contacts. Most of aviacompanies implement such measures, as well they apply HEPA filters for air cleaning, restrict the food serving, carry out disinfection procedure [6.7].

In order to ensure sanitary and epidemic well-being of the population and prevent emergencies, state, regional and other programs are implemented. An international laboratory network for the control of particularly dangerous infections is operating successfully [3]. In 2020 The Cabinet of Ministers of Ukraine has adopted the Strategy for Ensuring Biosafety and Biological Protection, based on the principle of "Single Health" that is proposed for the period from 2020 till 2025. According to its statements the main target is creation of unified system of biosafety and bioprotection. It is planned to establish four biosafety centers in Kyiv, Lviv, Odesa, and Kharkiv. Implementation of this strategy will improve national biosafety legislation. It allows to update methods of work with biohazards, improve control over the distribution and rules of working with them. It also stimulate the improvement of information and educational activities for both the population and the professional community. The following structures will be engaged in implementation and further stages of strategy fulfillment: The Security Service of Ukraine, the National Police, the National Academy of Sciences, as well as the Center for Public Health of Ukraine, the Ministry of Health of Ukraine, the State Service of Ukraine for Food Safety and Consumer Protection will work on this [8].

**Conclusions**

Due to unstable situation with infectious diseases in the world, significant traffic and human flows through the territory of Ukraine the problem of biosafety for Ukraine remains extremely relevant. It was shown that the state performed various important steps in order to ensure the measures of bioterrorism prevention. Aviation industries as well develop and undergo various guidelines, take part in international discussing and sharing experience on measures and attempts devoted to the biosafety establishment and maintenance.

## References


1. Das S., Kataria V. K. Bioterrorism: A public health perspective //Medical Journal Armed Forces India. – 2010. – Т. 66. – №. 3. – С. 255-260
2. Головацький О. О. Біотероризм: особливості та тактика протидії. – 2016– С. 18-20
3. Сибірна Р. І., Сибірний А. В. Проблеми боротьби із загрозою біотероризму в Україні. – 2016. – С. 495-499
4. Сердюк А. М., Скалецький Ю. М. Біологічна безпека України: реалії та проблеми //Україна. Здоров'я нації. – 2016. – №. 4 (1). – С. 7-12.
5. Звіт про діяльність Державної авіаційної служби України за 2020 рікhttps://www.kmu.gov.ua/storage/app/sites/1/17-civik-2018/zvit2020/davias-zvit-2020.pdf

6. Richard M. Biosecurity for air transport a roadmap for restarting aviation v.2 [Електронний ресурс]. – 2020. – Режим доступу до ресурсу: https://www.iata.org/contentassets/4cb32e19ff544df590f3b70179551013/roadmap-safely-restarting-aviation.pdf.

7. Bielecki M. et al. Reprint of: Air travel and COVID-19 prevention in the pandemic and peri-pandemic period: A narrative review //Travel medicine and infectious disease. – 2020. – Т. 38. – С. 101939.

8. Стратегія забезпечення біологічної безпеки та біологічного захисту за принципом «Єдине здоров'я» [Електронний ресурс] – Режим доступу до ресурсу: https://phc.org.ua/news/strategiya-zabezpechennya-biologichnoi-bezpeki-ta-biologichnogo-zakhistu-za-principom-edine.