

Biomedical and Social Aspects of the Spread of Infectious Diseases in the Modern Period of Time

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Abstract: The paper presents an overview of the state of the Art on the current medical, biological, and social risks. They determine the current epidemiological situation for a number of infectious diseases with different mechanisms of pathogen transmission. The risks of multi-country outbreaks and cross-border drift of pathogens are shown. The authors provide a number of recommendations to improve the training of health professionals on the control of modern threats of an epidemiological nature.

1. Introduction

At the turn of centuries, many problems have been successfully solved by mankind. Among such methods, we would like to note improving medical care for the population (diagnosis, treatment, rehabilitation), satisfying the household and production needs of citizens. However, technological progress has also led to the formation of new risks of the spread of infectious diseases. In addition, there was a rapid, by evolutionary standards, change in the model of human nutritional behavior, and in a number of countries there was a transformation of family-gender relations. These processes actively form the modern social and biomedical profile of epidemiological threats. Epidemiological complications in a number of nosological forms manifest themselves unexpectedly broadly against the background of a decrease in patient compliance with treatment and healthcare in general, due to a variety of reasons, including disappointment in medicine (due to the return of a number of infectious diseases, the emergence and spread of new ones); vaccinophobia, replication in the information environment of false and pseudoscientific information about the causes of diseases (for example, about the human immunodeficiency virus, about the disease caused by the Ebola virus), etc. The most striking examples of this are large outbreaks of measles in the recent period in countries that previously had the status of free from this disease [11; 24; et al.]; the spread of the disease caused by the Ebola virus under conditions of resistance of the local population to restrictive and therapeutic measures [8]. Obviously, to improve the modern system of preventive and anti-epidemic measures, it is necessary to take into account not only well-known, but also rare (new) clinical and epidemiological features and biomedical as well as social risks of the spread of infectious diseases.

2. Materials and Methods

A comprehensive epidemiological research method was used in the research. The analysis of epidemiological manifestations, biomedical and social risk factors for the spread of infectious diseases in the world was carried out according to official data from the World Health Organization, published data from scientific papers, conference proceedings, Internet resources (ProMed-mail, CDC sites, Federal Surveillance Service in the field of consumer protection and human well-being, etc.), using a historical-evolutionary approach for the scientific substantiation of proposals for improving the training of specialists health care

and raising awareness among non-medical tourism workers on the prevention of infectious diseases. In total, 109 sources of information were analyzed according to the materials of the work.

3. Results

In the current century, the problem of increasing in the spread of infectious diseases of various etiologies by migrants (labor, as well as people arriving in prosperous countries from areas covered by natural disasters and military conflicts), tourists and people who leave their usual populated places for other purposes and for different time periods, becomes more and more relevant and is reflected in numerous works of researchers [23; 24; 14; 32; 29; 30; 36; 5; 3; 28; 31; et al.]. At the same time, with the accumulation of scientific data with details for each of these episodes, it becomes possible to expand knowledge about the medical and biological and social risk factors for human infection in modern conditions, as well as adjust the spectrum and scope of preventive, sanitary and anti-epidemic measures. So, in recent years, more and more outbreaks of legionellosis are directly associated with the provision of medical services: with clean and wellness technologies SPA (*Sanitas pro Aqua*, lat.), with treatment at resorts. In 2002, the largest outbreak of legionellosis was recorded in the Japanese SPA complex (as a result of which 295 people became ill and 7 died) [22]. Outbreaks in sanatorium complexes and SPA centers in the USA were also recorded in 2018. At the Sarasota resort in the state of Florida 11 people fell ill, and the outbreak was associated with SPA procedures and visits to 2 pools [17]. In European countries, the disease of legionnaires was detected in the resorts of Spain (in 2015, 228 people fell ill, two of them died), Italy, and also in Japan [9; 16]. In addition, cases of legionellosis infection among visitors to mass events due to inhalation of water aerosols (containing *Legionella* in doses sufficient to infect humans) generated by fountain equipment were noted. So, in September 2019, in the USA, 25 people were infected with legionellosis, and two died (residents of four districts of the state of North Carolina) during the fair in the agricultural center in Fletcher [18].

The resistance of pathogens to antibiotics has become a severe threat, and in cases of low patient adherence to treatment for infections such as tuberculosis, prolongation of sporadic instances over a long period of time can be observed. So, in Singapore, a link was established between fresh cases of tuberculosis infection and the situation in 2012, when among the regular visitors to the cyber-cafe of the shopping center, 5 people found multiresistant tuberculosis mycobacteria [35]. In the United States, tuberculosis was detected for 2 years among nightclub clients in New York and Alabama [34].

In large cities, in the modern period of time, the epidemiological risks increase many times due to the transmission of viruses by the airborne droplet mechanism at large transport hubs with a generally unfavorable global and regional epidemiological background (for example, measles) and a decrease in collective immunity due to the low coverage of the population with vaccination (preventive measures opponents of immunization in the Internet environment are actively opposing, as well as representatives of orthodox religious groups) [24]. So, in the current 2019, after the stewardess fatally died from a measles disease that was infected by a passenger, the Israeli Ministry of Health issued a warning about the high risk of infection of people with measles virus using flights arriving from London and Thailand [25; 26]. In 2018, in the context of a sharp aggravation of the measles epidemiological situation in the world, the trip of a measles-infected passenger aboard an airliner traveling from Taiwan to Thailand led to the infection of 21 people and the subsequent widespread of the disease. Epidemiological investigation of this situation revealed that most cases of measles transmission occurred at airports and during flight; secondary and tertiary cases included flight attendants, airport staff and passengers who were at the airport or traveling on the same board with the patient [13]. In this regard, it is appropriate to note the fact that in 2016, drifts of Yellow Fever to China were revealed by its citizens working in Africa. At the same time, passengers with clinical manifestations of the disease independently returned to their country of permanent residence (to receive the adequate treatment) by air transport, without causing suspicion of yellow fever in medical services that carry out cross-border control throughout the route of air travel [39; 19]. In the last decade, sales of fake Yellow Fever vaccination cards to travelers (and labor migrants) and the use of counterfeit or expired vaccines for Yellow Fever was identified. This fact raised well-founded fears of specialists regarding not only the introduction but also the possible rooting of this disease in India and South East Asia [38], with a predicted probability of an explosive spread of the disease among non-immune populations.

Catering establishments located at airports are also among the priority objects for disease surveillance with the alimentary transmission. So, in 2017, during an epidemiological investigation of six cases of

salmonella in Oslo, other cases were detected (21 patients were registered) in 10 provinces. This geographically widespread sluggish current outbreak (lasting from August to November) was due to extensive contamination with the pathogen of salmonella, one of the airport cafes [15]. The activation of natural focal infectious diseases also leads to a higher than before probability of their entry into megacities, as evidenced by the deaths from the Crimean hemorrhagic fever caused by the Congo virus, two residents of Karachi (Pakistan), as well as two Indian citizens in Jodhpur and Jaisalmer [7]. Other evidence includes the drift of Lass hemorrhagic fever, Ebola, Crimean hemorrhagic fever in Europe [1; 2], as well as the drift of monkeypox in 2018 to the UK [31] and earlier in the United States.

Among the population in Ireland, the United States, Germany, Italy, France, new risk groups for shigellosis, meningococcal meningitis, hepatitis A appeared. These are males who have sex with males (MSM), while 60% (or more) of patients identified in this at risk, a history of traveling to different regions and within the same continent and intercontinental trips associated with group cases of illness were noted [12; 27; 33; et al.].

Currently, such tourism as rural tourism should be assessed in terms of the likelihood of human infection with tularemia, campylobacteriosis, etc. So, in January 2017, 19 cases of campylobacteriosis were recorded in the UK among hotel visitors in the countryside after eating chicken liver paste [4]. In 2016, an oropharyngeal outbreak of tularemia was recorded among people who consumed grape must, and an epidemiological investigation revealed a transmission factor contaminated by secretions of rodents infected with a tularemia microbe, a mechanized harvester for collecting grapes of different varieties (*F. tularensis* ssp. *Holarctic* DNA was found in must and in the material from rodents) [10]. In recent years, outbreaks of listeriosis (due to the consumption of cheeses, melons), hepatitis E (when consuming insufficiently heat-treated pork products), and hepatitis A (associated with the source of infection – food service personnel) are characterized by a wide geographical distribution covering several countries [6; 20; 21; 37; et al.].

4. Discussion

In the current century, rare and new ways and factors of transmission of pathogens of infectious diseases complement the previously known ones, which, in aggregate, is due to the expansion of the global epidemiological field of diseases. At the same time, new socio-medical and environmental-biological prerequisites are being formed for the continuous alternation of outbreaks with different mechanisms and transmission routes, which requires constant attention and preparedness of medical services to stop the epidemiological complications. The outbreaks involve the population of both large cities and rural territories, as well as large flows of multidirectional transboundary and transcontinental migration of the population, acquire the features of a biological and social phenomenon that can significantly limit the response of medical services to disease outbreaks due to massive epidemiological complications (due to the rapid depletion of resources: material, personnel, etc.).

5. Conclusion

Current biomedical features of outbreaks are determined by the removal of pathogens far beyond their ranges (foci), and it is possible to superimpose the vectors of "nomadic" (gradually expanding to neighboring countries) and "rapid" (when using air transport by patients and carriers of infection pathogens) distribution options of the same nosological form or several at once. This forms the request of medical and other services for the development of comprehensive and unified measures for the most rapid purchase epidemiological situations. Do not underestimate the epidemiological significance of the MSM phenomenon, since new conditions are formed for the development of the epidemiological process in a number of nosological forms in this environment. It should be recognized that until now, in the prevention of infectious diseases, this phenomenon has been given insufficient attention. In order to improve the training of health professionals on the control of modern epidemiological threats, it is necessary to monitor infectious diseases using digital technologies. Also, the adjustment of the organization of preventive and anti-epidemic measures is highly important, taking into account modern socio-medical and biological characteristics of outbreaks. Timely informing doctors of other specialties about the new risks of the spread of infectious diseases is of the highest importance. In addition, it is necessary to put into practice regular information and consultations for

tourism workers on epidemiological risks, as well as intensify interaction with them on the organization of the prevention of infectious diseases among consumers of tourism services.

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