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MAIN SCIENTIFIC AND METHODOLOGICAL APPROACHES OF MODERN EPIDEMIOLOGY

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Abstract

WHO called upon its member-countries to "widen use of epidemiological data and methods for monitoring and assessment of the global health achievement strategy". The application of epidemiological approaches for the study of somatic diseases and development of appropriate preventive measures has brought up the concept of "epidemiology of non-infectious diseases". As a result, two research trends were formed: "epidemiology of infectious diseases" and "epidemiology of somatic diseases". At its current stage, infectious diseases prevalence/rate is also favoured by such factors as drastic social stratification and decline in the living standards of socially disadvantaged population groups, increase of active uncontrolled migration. Monitoring of antibiotic resistant microorganisms becomes an integral part of preventive and treatment procedures. The hospital infections acquire particular importance and are rated as one of the main problems for health system both in developing and highly developed countries. It is obvious that at its current stage epidemiology has acquired new characteristics conditioned not only by complexity of epidemiological situation on infectious diseases, but also with dissemination of many somatic diseases.

Keywords: evidence based medicine, epidemiology of infectious and somatic diseases, emerging diseases, hospital infections, prophylaxis, strategic goals

In the middle of the 20th century, epidemiology has found its modern place among medical sciences. In the 1980s a new trend of epidemiology was formed, called "evidence-based medicine" and directly related to clinical epidemiology, i.e. to the system of generalizing research based on the epidemiological analyses [*Pokrovski V. et al., 2004; Zueva L. and Sukhomlinova G., 2005*]. Having become a general medical science, epidemiology no longer focuses exclusively on the problems of infectious diseases, but has become one of the main tools for the study and prevention of public health. WHO has also shown interest in this aspect and insisted its member-countries to wider "use epidemiological data and methods for monitoring and assessment of the global health achievement strategy" [*Cherkasski B., 2002*].

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Originally, epidemiology was born within the field and for the study of infectious diseases only. Nowadays there is a convincing evidence that a number of somatic diseases *per se* proved to be typical infectious diseases as it was recently established for gastric ulcers, some tumors, cardiovascular pathologies, some blood related diseases, etc. [*Beral V., 1993; The Eurogast Study Group, 1993]*. Moreover, the application of epidemiological approaches for the study of somatic diseases and working-out appropriate preventive measures brought forth the development and substantiation of "epidemiology of non-infectious diseases" concept. As a result, two research trends were formed: "epidemiology of infectious diseases" and "epidemiology of somatic diseases", which, however, use identical methods and are both targeted at disease rate decrease. In numerous highly developed countries, the epidemiology is defined as a science to study health and disease

distribution among definite human populations, as well as the disease conditioning factors. It is precisely the scientific-methodological approach that the corresponding modern preventive measures are developed and applied upon [*Last J., 1988*].

Today the achievements in the area of infectious disease control are obvious, including eradication of smallpox, factual eradication of poliomyelitis in many countries of the world; dozens - and hundred-fold decrease of prevalence of infectious diseases controlled by the specific preventive measures (vaccinal prophylaxis) developed by genetic engineering methods [*Giseke J., 2004*]. Current epidemiological situation requires significant increase of informative value, specificity and sensitivity of methods for microbiological, serological, molecular-biological diagnosis of the most urgent infection diseases to be based on achievements of biotechnology and genetics [*Pokrovski V., Cherkasski B., 1999*]. The development of conceptually new methods of laboratory diagnosis allowed revealing the etiology of earlier unknown infectious diseases, as well as of a large group of non-infectious diseases. Conceptually new technologies of epidemiological control are developed by means of computer-based technologies and new software providing with graphic presentation of the epidemiological process.

However, recently more and more facts confirm that we are still far from the total suppression of infectious diseases. The social significance of some infectious diseases is clearly evidenced by the annual death rates worldwide: acute respiratory infections: 4.0 mln; diarrheas of different etiology: 3.5 mln; measles: 1.0 mln; hepatitis B: 0.9 mln; tuberculosis: 0.3 mln, etc. [*Cherkasski B., 2002*].

Due to deep qualitative changes of the etiological factor, serious difficulties arose with the prevention and treatment of "newly emerging old diseases", such as tuberculosis, syphilis, cholera, anthrax, malaria, yellow fever, etc. A serious problem is posed by the "new" diseases, the list of which during the last decades has already exceeded 40 clinical entities, including HIV/AIDS, viral hemorrhagic fevers of Lass, Ebola, Marburg, as well as Omsk hemorrhagic fever, legionellosis, prion disease, SARS (atypical pneumonia), Avian flu, etc.

No doubt, the appearance of new pathogenic organisms (agents) is partially due to the scientific and technologic progress of the 20th century, which was unprecedented in the whole history of human civilization and which dramatically accelerated the evolution of microorganisms.

Infectious disease rate at its current stage is also favoured by such factors as drastic social stratification and decline in the living standards of the disadvantaged groups of society, active uncontrolled migration, the increased number of people with no fixed abode, the increased number of outcast animals and promotion of exotic animals, the livestock products trade, etc.

The infections caused by strains of polychemoresistant microorganisms became imminent. Monitoring of antibiotic-targeted resistance of microorganisms becomes an integral part of treatment and preventive procedures. Referring to the above, the hospital infections acquire particular importance and are rated as one of the main problems for health systems both in developing and highly developed countries (in the USA the nosocomial infection mortality rate exceeds 80000 people per annum).

The hospital-acquired infections are mostly conditioned by and derived from the extended and sometimes uncontrolled use of antibiotics and antiseptics that postpones the problem solution for an indefinite period, required for development of new-generation antibacterial preparations (probably natural), which do not develop resistance in microorganisms. Meanwhile, for the prevention of hospital-acquired infections, a strong control of septic-purulent diseases rate is required both at hospital and after the discharge from the medical institution. The risk group also includes the medical staff, and the appropriate health control requires a careful attention.

In many countries, parasitic diseases also remain to be important and significant in the infectious pathology. Malaria alone annually kills about 1.5 million people [*Cherkasski B., 2002*]. It urges taking traditional preventive measures,

as well as scientifically grounded research aimed at development of new antiparasitic preparations and effective disinsection measures in case of vector-borne mechanism of transmission.

In view of the aforementioned, ensuring epidemiological well-being of people and its legislative control acquire a particular importance. The prevention and infectious disease dynamic control are strategic targets for health systems in the 21st century. The prevalence of infectious diseases due to their social, epidemiological and economical significance is a very important component of health index for all countries [*Pokrovski V., Cherkasski B., 2003*].

At the threshold of the 21st century, epidemiology as a science has encountered such problems as local armed conflicts, regional wars, man-made and natural disasters, ever-growing in urgency bioterrorism relevant issues, thus requiring the priority to adjust scientific research to the current emergency situation. We have to state that at the beginning of the 21st century the number and the variety of scientific and applied problems encountered by epidemiology has increased, including the study, adaptation for different countries and implementation of clinical epidemiology, introduction of new methods of disinfection, immunoprophylaxis, prevention of hospital infections, revealing reasons of re-occurrence of the "old" and emergence of the "new" infections.

This is the incomplete list of epidemiological issues requiring scientific research and not only a contemporary epidemiologist, but also a general practitioner should be able to handle problems.

Summing up the aforementioned, it is obvious that at its current stage the science of epidemiology has acquired new characteristics deriving not only from more complicated epidemiological situation in terms of infectious diseases, but also via dissemination of many somatic diseases.

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