

Emerging and re-emerging infectious diseases: tackling the challenge on a global level

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After the Second World War the general feeling was to have solved almost all the most important problems of dealing with infectious diseases. This feeling appeared to be appropriate and supported by the identification of new allies such as new antibiotics and vaccines. However, in 1991 the Institute of Medicine of the National Research Council in the US appointed a 19-member multidisciplinary expert committee to study the old and new microbial threats to health. Their final report was entitled '*Emerging Infections - Microbial Threats to Health in the United States*', but the concepts they treated can be applied worldwide [1]. They concluded that six main categories of factors could explain the emergence (outbreaks of previously unknown diseases, or significant increase of incidence in humans of known diseases in the past years) or re-emergence (reappearance of diseases after a significant decline in incidence) of infectious diseases: human demographics and behaviour; technology and industry; economic development and land use; international travel and commerce; microbial adaptation and change; and breakdown of health measures. These events can expose humans to animal or arthropod carriers of disease increasing the possibility for pathogens to be transferred from animal reservoirs to humans. Recently, the emergence of diseases with high case fatality rates - such as AIDS, severe acute respiratory syndrome (SARS), H5N1 avian influenza and pandemic influenza A (H1N1) 2009 virus, that brought to the declaration by WHO of pandemic phase 6 - have catapulted emerging and re-emerging infectious diseases to the top of the medical and political agendas, simultaneously highlighting the importance of wildlife as reservoirs or vectors for disease. Pathogens originating from an animal or animal-derived product caused approximately 75% of new diseases affecting humans over the past ten years. Threats of outbreaks of diseases such as avian flu, SARS and H1N1/A influenza further highlight the need for integration and remind us that human and animal health are intimately connected. A broader understanding of health and diseases demands a unity of approach achievable only through a consilience of human, domestic animal and wildlife health - One World, One Health [2].

In Italy the epidemiological revolution of the 20th century was well described by De Flora *et al.* in an article published in 2005, in which the trend of the main pathologies and accidents was reconstructed by the 1901 through recalculation of yearly mortality rates [3]. At the beginning of the 20th century, the main causes of death were represented by diseases of the respiratory and digestive systems and by other infectious and parasitic diseases. Thereafter, the trend in mortality of these diseases decreased progressively until the mid-century, when appeared well marked a crossover of mortality curves, with cardiovascular diseases, cerebrovascular diseases and tumors accounting for more than 70% of the deaths. In the last decades of the century also deaths from chronic diseases started to decline, especially in males. Globally, it has been calculated that more than 1 million lives are

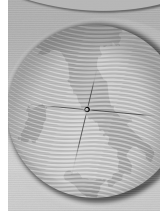


saved every year in Italy as compared with the late 19th century, mainly due to the discoveries made in the field of biomedical sciences and the improvement of hygienic condition as well as the progress in preventive and curative medicine.

In the last two decades of the 20th century a new increase of the incidence of infectious diseases has been witnessed. This trend is well documented in the U.S., where infectious disease mortality declined during the first eight decades of the 20th century from 797 deaths per 100 000 in 1900 to 36 deaths per 100 000 in 1980. From 1981 to 1995, the mortality rate increased to a peak of 63 deaths per 100 000 in 1995. The emergence of AIDS in the age-range 25-64 and tuberculosis, pneumonia and influenza in persons aged 65 years and older were the most important causes of this increase [4].

In Europe the incidence trend of infectious diseases is constantly under surveillance by the European Centers for Disease Prevention and Control (ECDC). In 2007 the ECDC started to publish a comprehensive Annual Epidemiological Report (AER) on 49 communicable diseases in Europe covering, in depth, all areas under ECDC surveillance. The first report, taking into account the limits in comparability due to the heterogeneity in European surveillance systems, provided an overview of the annual incidence and the 10-years general trend of the 49 diseases under surveillance [5]. Of these 49 diseases, 22 are in double or triple digits (per 100 000 population), with half of these 22 also having rising (or stable) trends. It is also of concern that 14 of the above 22 diseases affect the younger age groups (under 24 years), indicating the need of a higher level of surveillance activity and prevention among younger people. Many of the rest, with the exception of legionellosis and tuberculosis, affect mainly the economically productive population. Considering the incidence trends, the public health impact and the emerging threats, the ECDC identified the five diseases, or groups of diseases, representing the major communicable disease threats in the EU: healthcare-associated infections, with or without antimicrobial-resistant pathogens; HIV infection and AIDS; pneumococcal infections; influenza; tuberculosis.

The articles included in this issue of the *Italian Journal of Public Health* face the continuing problems with various emerging and re-emerging infectious diseases, in Italy as well as in other countries. In their article Vigna-Taglianti *et al.* [6] describe the incidence trend and risk factors of syphilis infection in a large Region of northern Italy. The authors pointed out the need of continuing surveillance on sexually transmitted diseases as well as health education and counselling in high-risk environment, since the risk of a syphilis diagnosis is strongly related to HIV self-reported infection and inappropriate sexual behaviors. A very important topic has been addressed by Panico *et al.* [7], who assessed knowledge, attitudes and behaviour of healthcare workers regarding influenza and vaccination in a southern Region of Italy. The vaccination rate they found, equal to 15%, is symptomatic of a lack of education among healthcare workers about influenza prevention. Increasing these low vaccination rates among healthcare workers, to substantially improve patients safety is an important public health point, implying the need of a comprehensive national approach to influenza prevention that includes education and strong encouragement of routine annual vaccination among healthcare workers. De Giusti *et al.* [8] deal with the problem of food contamination by verocytotoxin-producing *Escherichia coli* O157 in a hospital setting, suggesting that methods based on enzyme-linked-fluorescent-assay are very useful for their rapidity and specificity to detect the bacterium in raw meat samples. Lo Nostro *et al.* [9] emphasized the need of surveillance of structures frequented by immunocompromised hosts (hospitals, nursing homes, spa, etc.) to prevent diseases due to water contamination by *Legionella*. The other three research published in this journal issue are very important because they were carried out in India and

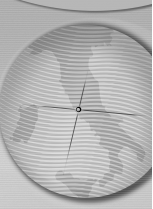


Pakistan, two Asian countries in which control of infectious diseases is still a great challenge. Gowda *et al.* [10] reported two cases of severe malaria with non-specific clinical features but responsible of renal failure. The cross-sectional study conducted by Divakaran *et al.* [11] pointed out that the large number of tuberculosis patients that are still approaching private pharmacies for antituberculosis drugs is a huge indicator of the non-adherence to the Direct Observation Treatment Short course (DOTS), made available in India to everybody by the Government free of charge. Finally, Ali *et al.* [12] show the results of the analysis of four different soils in which new bacterial strains were found, that may be useful to enhance the future research in the field of antimicrobials and antymicrotics.

As we focus on the problems of emerging and re-emerging infectious diseases, we must not underplay other diseases and health conditions that also significantly impact on all of us. With limited resources for disease control and prevention, we must learn how to better use these resources [13,14]. Better planning, more attention to training, improved efficiency, and strengthening the collaboration and co-operation between disciplines [15] and countries will help in our efforts to reduce the burden of disease.

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