



Public Health Security in 21ST Century: Global Issues

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EDITORIAL

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Global public health security is defined as the activities required, both proactive and reactive, to minimize vulnerability to acute public health events that endanger the collective health of populations living across geographical regions and international boundaries.

Since 1951, the world has changed dramatically, when World Health Organization (WHO) issued its first set of legally binding regulations aimed at preventing the international spread of disease. At that time, the disease situation was relatively stable. Concern focused on only six "quarantinable" diseases: cholera, plague, relapsing fever, smallpox, typhus and yellow fever. New diseases were rare, and miracle drugs had revolutionized the care of many well known infections. People travelled internationally by ship, and news traveled by telegram.

In the year 2007, on world health day, celebrated on 7th April, launched WHO's discussion on global public health security. On that day, around the world, the academics, students, health professionals, politicians and the business community are engaged in dialogue on how to protect the world from threats like pandemic influenza, the health consequences of conflict and natural disasters and bioterrorism.

Today's highly mobile, interdependent and interconnected world provides a myriad opportunities for the rapid spread of infectious diseases, and radio nuclear and toxic threats, which is why updated and expanded regulations are necessary. Infectious diseases are now spreading geographically much faster than at any time in history. It is estimated that 2.1 billion airlines passengers travelled in 2006; an outbreak or epidemic in any one part of the world is only a few hours away from becoming an imminent threat somewhere else¹.

Infectious diseases are not only spreading faster, they appear

to be emerging more quickly than ever before. There are now nearly 40 diseases that were unknown a generation ago. In addition, during the last five years, WHO has verified more than 1100 epidemic events world wide.

Cholera, yellow fever and epidemic meningococcal diseases made a comeback in the last quarter of the 20th century and call for renewed efforts in surveillance, prevention and control. Swine flu (H1N1), Severe Acute Respiratory Syndrome (SARS) and Avian influenza (H5N1) in humans have triggered major international concern, raised new scientific challenges, caused major human suffering and imposed enormous economic damage. Other emerging viral diseases such as Ebola, Marburg hemorrhagic fever and Nipah virus posed threats to global public health security and also required containment at their source due to their acute nature and resulting illness and mortality.

Another category of threat to public health security concerns the continuing and increasing evolution of resistance to anti-infective drugs, which is a major factor in the emergence and re-emergence of infectious diseases. Bacteria can develop resistance to antibiotics through spontaneous mutation and through the exchange of genes between strains and species of bacteria².

Gains in many areas of infectious diseases control are seriously jeopardized by the spread of antimicrobial resistance, with extensively drug-resistant tuberculosis (XDR-TB) now a cause of great concern. Drug resistance is also evident in diarrheal diseases, hospital-acquired infections, malaria, meningitis, respiratory tract infections and sexually transmitted infections and is emerging in HIV³.

The food chain has undergone considerable and rapid changes over the last 50 years, becoming highly sophisticated internationally. The trading of contaminated food between countries increases the potential that outbreaks will spread. In addition, the emergence of new food borne diseases creates considerable concern, such as the recognition of the variant of Creutzfeldt-Jacob disease (vCJD) associated with Bovine Spongiform Encephalopathy (BSE).

As activities related to infectious disease surveillance and laboratory research have increased in recent years, so too has the potential for outbreaks associated with accidental release of infectious agents. Breaches in biosafety measures are often responsible for these accidents. At the same time, opportunities for malicious releases of dangerous pathogens, once unthinkable, have become a



reality, as shown by the anthrax letters in United State of America in 2001.

In addition, the recent past has been marked by disturbing new health events that resulted from chemical or nuclear accidents and sudden environmental changes, causing major concerns in many parts of the world.

The potentially deadly risks of the international movement and disposal of hazardous wastes as an element of global trade were vividly illustrated in Côte d'Ivoire in August 2006. Over 500 tons of chemical waste were unloaded from a cargo ship and illegally dumped by trucks at different sites in and around Abidjan. As a result of this, almost 90,000 people sought medical treatment in the following days and weeks. Although less than 100 people were hospitalized and far fewer deaths could be attributed to the event, it was a public health crisis of both national and international dimensions⁴.

The broad scope of the International Health Regulation (IHR) 2005 allows for the inclusion of radio nuclear and chemical events that have the potential to cause harm on a global scale. Such events, regardless of origin, rely on the same epidemiological principle of surveillance, early detection and response as biological threats in order to safeguard health.

It has long been recognized that many countries have limited capacities to detect and respond to chemical incidents and that such events occurring in one country could have an impact on others. Equally recognized has been the need to strengthen both national and global public health preparedness and response.

In 2002, WHO established the Chemical Incident Alert and Response System to operate along similar lines to the alert and response system for communicable diseases. In 2006, this system was extended to cover other environmental health emergencies, including those related to the disruption of environmental health services, such as water supply and sanitation, as well as radiological events.

An integral part of the system is Cheminet, which pools human and technical resources for assessing, detecting, verifying the outbreaks; provision of rapid, appropriate and effective assistance in response to outbreaks; and contribution to long term preparedness and capacity building – the same protocol utilized in response to in any public health emergency.

Environmental disasters like the Tsunami (2006), Super cyclone in Orissa, earthquake in China and in Europe (2003) and heat wave which claimed the lives of 23000 persons and which was linked to unprecedented extreme weather, are also new public health threats.

Polio is one of the four internationally notifiable diseases specifically listed in IHR (2005). The 2003-2006 international spread of poliovirus was a wake-up call to a world expecting to bid farewell to polio. While inadequate control played a catalytic role in that outbreak, the application of IHR (2005) to a similar situation in the future might greatly facilitate a timely response and substantially reduce the public health consequences.

Given progress towards the goal of global polio eradication and the risk of polio reintroduction or re-emergence in a post eradication world, long-term surveillance for polioviruses takes on a new importance. The designation of polio in IHR (2005) will further help to prevent, control and interrupt the

international spread of the disease in the event of an outbreak during and after eradication. As IHR (2005) comes into force, countries will be assessing their capacity to identify, verify and control circulating wild polioviruses⁴.

It is argued that many of the public health emergencies would have been prevented or better controlled if the health systems concerned had been stronger and better prepared. Some countries find it more difficult than others to confront threats to public health security effectively because they lack the necessary resources and their health infrastructure has collapsed as a consequence of under-investment and shortages of trained health workers or because the infrastructure has been damaged or destroyed by armed conflict or a previous natural disaster. With rare exceptions, threats to public health are generally known and manageable.

The rapid scientific and technological advances of the late 20th century and flourishing international partnerships in health that use the latest communications have together led to a much better understanding of importance of public health events in today's globalized world.

Fifty-seven countries, most of them in sub-Saharan Africa and South-East Asia, are struggling to provide even basic health security to their population. Then, how can they be expected to become a part of an unbroken line of defense, employing the most up to date technologies, upon which global public health security depends?

Such a defense is reliant on strong national public health systems that are well-equipped - both with appropriate technology and talented and dedicated personnel - to detect, investigate, communicate and contain events that threaten public health security whenever and wherever they occur.

Clearly, the strengthening of weaker health systems is essential not only to assure the best possible public health of national population, but also to assure global public health security. These national and international priorities are welded together by IHR (2005), which call for national core capacity strengthening and collective global action for public health emergencies of international concern - that event that endanger global public health.

The basis of an effective global system of epidemic alert and response was initiated by WHO in 1996. It was built essentially on a concept of international partnership with many other agencies and technical institutions. Systematic mechanisms for gathering epidemic intelligence and verifying the existence of outbreaks were established and prompted risk assessments, information dissemination and rapid field response. The Global Outbreak Alert and Response Network (GOARN) was set up as a technical partnership of existing institutions and networks to pool human and technical resources for rapid identification, confirmation and response to outbreaks of international importance. The network provides an operational and coordination framework to access this expertise and to keep the international community constantly alert to the threat of outbreak and ready to respond.



The success of IHR (2005) depends to a large extent upon strong Global/International partnerships. In many areas, such as in the area of infectious disease and chemical dangers, these partnerships already exist. In others, they need to build partnerships between, for example, ministries of health and WHO, are well established and will more easily fall in step with the requirement of IHR (2005). Seven strategic actions were set to guide IHR (2005) implementation. These seven steps are: foster global partnerships, strengthen national disease surveillance, prevention, control and response systems, strengthen public health security in travel and transport, strengthen WHO global alert and response systems, strengthen the management of specific risks, sustain rights, obligations and procedures, conduct studies and monitor progress⁵.

National, intermediary and local public health systems are charged with providing the core capacities needed to detect, assess, report and deploy rapid control measures to public health events of international concern. In the line with regulation, member states must complete an initial assessment of their capacity to meet these requirements by June 2009 deadline and if found insufficient, develop a national plan to build the necessary capacity within the following three years. Several countries began capacity building and implementation of the regulation before they entered into force. For many more countries, financial and human resources constraints will hamper their ability to meet the deadline. WHO has a critical role to play in assisting countries to build capacity and estimates that it will have to support 115 countries to develop national plans of action or strategy papers to meet the Regulation core capacity requirement⁶.

CONCLUSION AND RECOMMENDATIONS

A truly effective international preparedness and response coordination mechanism cannot be managed nationally. Global cooperation, collaboration, and investment are necessary to ensure a safer future. This means a multi-sectoral approach to managing the problem of global disease that includes governments, industry, public and private financiers, academia, international organizations and civil society, all of whom have responsibilities for building public health security. In achieving the highest level of global public health security possible, it is important that each sector recognizes its global responsibility. The IHR (2005) mandate core capacities for countries and obligations for WHO. They do not oblige other sectors to act in accord. Nonetheless, the building of global public health security rests on a solid foundation of transparent and benevolent partnerships. In the spirit of such partnership, WHO urges all involved to acknowledge their roles and responsibilities for global public health security through following recommendations:-

1. Full implementation of IHR (2005) by all countries. The IHR (2005) mandates core capacities for national and global public health must be transparent in government affairs.
2. Global cooperation in surveillance and outbreak alert and response between governments, United Nations agencies, private sector industries and organizations, professional associations, academia, media agencies and civil society,

building particularly on the eradication of polio to create an effective and comprehensive surveillance and response infrastructure.

3. Open sharing of knowledge, technologies and materials, including viruses and other laboratory samples, necessary to optimize secure global public health. The struggle for global public health security will be lost if vaccines, treatment regimens, and facilities and diagnostics are available only to wealthy persons.
4. Global responsibility for capacity building within the public health infrastructure of all countries. National systems must be strengthened to anticipate and predict hazards effectively both at the international and national levels and to allow for effective preparedness strategies.
5. Cross – sector collaboration within governments. The protection of global public health security is dependent on trust and collaboration between sectors such as health, agriculture, trade and tourism. It is for this reason that capacity to understand and act in the best interests to the intricate relationship between public health security and these sectors must be fostered.
6. Increased global and national resources for training of public health personnel, the advancement of surveillance, the building and enhancing of laboratory capacity, the support of response networks, and the continuation and progression of prevention campaigns.

References

1. Fact sheet: IATA. Geneva, International Air Transport Association, 2007
2. Heymann DL. Emerging infections. In: Schaechter M, ed. The desk encyclopedia of microbiology. Amsterdam, Elsevier Academic Press, 2004
3. Gandhi NR, Moll A, Strum AW, Pawinski R, Govender T, Lalloo U et al. Extensively drug-resistant tuberculosis as a cause of death in patients co-infected with tuberculosis and HIV in a rural area of South Africa. *Lancet*, 2006, 368: 1575-1580
4. Global public health response to natural occurrence, accidental release or deliberate use of biological and chemical agents or radio nuclear material that affect the health Geneva, World Health organization 2002.
5. International Health regulation (2005). Article 1 Definitions. Geneva, World Health organization, 2006.
6. Medium- term strategies plan 2008-2013 and proposed programme budget 2008-2009. Geneva, World Health Organization, 2007.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.