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The microbial threat in fragile times: balancing known and unknown risks

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The infrastructures that protect public health on a daily basis go mostly unnoticed until diseases become a threat. News of *E. coli* in the water supply, BSE agent in the food chain or anthrax in the postal system puts the spotlight on the public health system and raises important questions about its ability to keep the public safe.

Microbes proliferate rapidly, mutate frequently, and adapt easily to new environments and hosts. Numerous factors, including human activities, can accelerate and amplify these natural phenomena (1). As a result, pathogens that are new to humans are being identified with disturbing frequency. Epidemic-prone diseases such as dengue, yellow fever and meningococcal meningitis have become resurgent, sometimes in more virulent forms. Control of TB and malaria through standard measures is eroded by antimicrobial resistance. Diseases such as West Nile fever and Rift Valley fever have spread to new continents and become endemic there. Influenza — one of the most mutable viruses — demands regular worldwide surveillance to predict which strains are required for vaccine, and to detect the next antigenic shift that could launch a global pandemic.

In recent years, unusual epidemics as well as new diseases have occurred on every continent. Some of the more spectacular recent outbreaks in industrialized countries have been due to changes in the behaviour of a pathogen that allowed it to circumvent the defences of public health. Examples include *E. coli* serotype O157:H7 thriving in highly acidic foods and beverages such as mayonnaise and cider, and BSE agent surviving all conventional deactivation procedures.

It is in the developing countries, however, that new diseases and outbreaks occur most often. It is there too that the laboratory and surveillance capacity to detect and contain these diseases is sometimes lacking. In many parts of the developing world people face biological terror on a permanent basis in the form of diseases such as cholera, dengue, measles, meningitis, shigellosis, and yellow fever. Though Ebola gets spectacular publicity whenever it occurs, it is these more common diseases, as well as AIDS, that can and do cause most devastation in the form of death, disability and economic loss.

Beginning with the 1992 publication of the US Institute of Medicine's landmark report on emerging infections, the resurgence of infectious diseases has been viewed as a factor that can undermine national and international security (2). AIDS in particular convinced the world that a previously unknown pathogen could destabilize whole regions. The highly publicized emergence of new diseases and re-emergence of others, combined with the increased speed and volume of international travel, have made countries aware of their vulnerability.

With the use of anthrax to incite terror, a range of new issues arises within an already complex mix of competing priorities and uncertainties. In uniting against the infectious disease threat, how much priority should the international community give to an unknown yet potentially catastrophic risk, such as the deliberate release of smallpox, when over 14 million people continue to die each year from well-known and often preventable infectious diseases? What priority should be given to the stockpiling of vaccines and drugs against a possible bioterrorist attack when so many millions of preventable deaths are attributed to lack of access to essential drugs?

Since 11 September 2001, WHO has often been asked about how to respond to a bioterrorist attack. The answer is that the epidemiological and laboratory techniques needed to detect and contain an outbreak are the same whether that outbreak is deliberately caused or natural. Adequate data on the prevalence of natural background diseases make it much easier to recognize an unusual and possibly deliberately caused disease.

The "invisible" infrastructure for global disease surveillance and response exists and is firmly in place. It is the Global Outbreak Alert and Response Network (GOARN), formally inaugurated by WHO in April 2001. A "network of networks", GOARN interlinks, in real time, over 100 existing networks which together possess much of the data, expertise and skills needed to keep the international community constantly alert to outbreaks — whatever the cause — and ready to respond. The network, which operates within the framework of the International Health Regulations, is supported by a computerized system for gathering disease intelli-

gence, and makes full use of the power of electronic communications (3).

Between July 1998 and August 2001, WHO verified 578 outbreaks of potential international importance in 132 countries, and investigated many hundreds more. Twenty-two countries, many affected by complex emergencies, had 10 or more verified epidemics. The most common natural outbreaks were of cholera, meningitis, haemorrhagic fevers, viral encephalitis, and anthrax (3).

The world faces the prospect of surprises arising from the volatile microbial world on a daily basis. The threats posed by infectious diseases have global causes and effects that can only be managed with global partnerships supported by strong national public health capacity. Foreign policy agendas which aim at building a more secure world are therefore increasingly including infectious disease prevention and control. As stated in November 2001 in the *Ottawa Plan for Improving Health Security*, strengthened global capacity for routine disease surveillance and response is an essential component of preparedness for a possible attack using biological weapons (4). This approach is seen as a wise "dual use" investment which prepares for a potential security threat while at the same time yielding a clear benefit for public health.

Such advice rings especially true for an ever more interconnected world. Whether outbreaks are caused naturally or deliberately, and whether they start in developing or industrialized countries, every country is vulnerable to them. When the world strengthens its defences against known disease threats it can only be better protected against those that are unknown as well. ■

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