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

David L. Heymann1

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.

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