

Preface

Global health security has become a major international concern. Our population faces imminent threats to human and animal health from the emergence and reemergence of epidemic-prone infectious diseases, linked to the significant impact that these outbreaks are already having on national and international economies. The concept and drivers of disease emergence were clearly documented 20 years ago in the Institute of Medicine's seminal 1992 report, *Emerging Infections: Microbial Threats to Health in the United States* (http://www.nap.edu/catalog.php?record_id=2008). This volume described the mechanisms leading to emergence and spread of zoonotic diseases and highlighted possible strategies for recognising and counteracting the threats. It has long been known that many of these diseases can cross the species barrier between humans, wildlife, and domestic animals; and indeed over 70 % of novel emerging infectious diseases are zoonotic, that is, they have their origins in animal reservoirs. There have been many examples of this since the Institute of Medicine's report two decades ago, including the emergence of H1N1 pandemic influenza virus, the SARS coronavirus, Nipah and Hendra viruses, Australian bat lyssavirus, Malaka virus, avian influenza H5N1 and H7N9, and MERS coronavirus, to name but a few.

These diseases remind us that the health of humans, animals and ecosystems are interconnected, and that to better understand and respond rapidly to zoonotic diseases at the human–animal–environment interfaces requires coordinated, collaborative, multidisciplinary, and cross-sectoral approaches. This holistic approach has been referred to as 'One Health', indicative of the commonality of human and animal medicine, and their connection to the environment. Although the concept is not new, 'One Health' has gained added momentum in the aftermath of the SARS epidemic of 2003 which posed the first major threat to human health and global economy of the new millennium. These concerns added to the mounting fears that highly pathogenic avian influenza H5N1 could develop into next severe influenza pandemic. Not only would such a pandemic lead to significant mortality and morbidity, but the World Bank has estimated that it could cause a decline of up to 5 % of global GDP (damages of US\$3 trillion), causing far-reaching disruptions in the lives of people, communities, and countries. Thus there are compelling reasons to develop new approaches that will improve the detection, prevention, and control of zoonotic diseases. In particular, it is essential that we breakdown the old

concepts of professional silos and encourage a new era built around trust and multidisciplinary, cross-sectoral approaches.

The present momentum of 'One Health' can also be traced in part to the 2004 meeting of the Wildlife Conservation Society on 'One World, One Health: Building Interdisciplinary Bridges to Health in a Globalized World'. The outcomes of the meeting were encapsulated in a series of 12 recommendations known as the Manhattan Principles that set priorities for an international, interdisciplinary strategy for combating threats to the health of life on Earth (<http://www.oneworldonehealth.org>). The momentum since 2004 has been maintained through a number of international ministerial meetings, including the International Ministerial Conferences on Avian and Pandemic Influenza (IMCAPI), which have been held to discuss issues relating to the spread, transmission, and possible containment of highly pathogenic avian influenza (H5N1), culminating at the 2010 meeting in Hanoi with the agreement between the Food and Agriculture Organization (FAO), the World Organization for Animal Health (OIE), and World Health Organization (WHO), entitled 'The FAO-OIE-WHO Collaboration: Sharing Responsibilities and Coordinating Global Activities at the Animal-Human-Ecosystems Interfaces'. The coordination between these three international organizations has also led to the formation of the Global Early Warning System for Major Animal Diseases including Zoonoses (GLEWS) which provides the intelligence essential to identify and ameliorate both human and animal diseases (<http://www.glews.net>) through sharing of information of disease events, epidemiological analyses, and risk assessments. In addition, it is highly probable that any new zoonotic disease would be detected through WHO's new International Health Regulations (2005) which are aimed at assisting countries in working together to save lives and livelihoods through a legal requirement for countries to rapidly detect and report outbreaks of disease of international concern.

This leadership is an essential component to operationalize 'One Health' ideals. Major scientific meetings have been held in Winnipeg through Health Canada and at Stone Mountain, Georgia through the Centers for Disease Control and Prevention, and by a wide variety of other interested groups such as the European Commission, joint meetings of FAO-OIE-WHO, Global Risk Forum (Davos), Institute of Medicine, the World Bank, APEC, and the Asian Development Bank. Many smaller, national, and regional meetings have also been held to further local One Health planning. Of particular importance has been the information dissemination by the One Health Initiative website (<http://www.onehealthinitiative.com>) and the more recently established One Health Global Network's Web portal (<http://www.onehealthglobal.net>) which have continued to build and sustain this momentum by providing a rapid means of communication and sharing data and news. As the field of One Health matures, we have also begun to see the growing involvement of ecologists, wildlife biologists, environmental scientists, and the fusion of the fields of 'EcoHealth' and 'One Health'. There has also been considerable support for the 'One Health' approach in the United States through a partnership of major professional organizations that have formed the One Health Commission, which brings together the American Medical Association, the

American Veterinary Medical Association, the American Public Health Association, the Infectious Diseases Society of America, the Association of American Medical Colleges, and the Association of American Veterinary Medical Colleges. The inclusion of the latter two organizations is particularly relevant, breaking down professional barriers or silos through education. A number of universities and colleges are starting to respond with new ‘One Health’ courses; and one university, the University of Edinburgh, has developed a Masters postgraduate degree course.

More than 200 years ago, the German writer, artist and politician, Johann Wolfgang von Goethe, reminded us that: “Knowing is not enough; we must apply. Willing is not enough; we must do.” That epithet applies well to the ‘One Health’ movement, because in the midst of all the information that has been gathered about the health of humans, animals, and ecosystems, as well as the desire of many people in many nations and organizations to implement viable public health solutions, application and action are essential. In this context, ‘One Health’ is not a new form of governance or a critique of existing patterns of governance. Rather, ‘One Health’ is a movement dedicated to building new levels of trust and transparency between disciplines, nations, organizations, and people. Such trust and transparency must begin with inspirational educational curriculums, teaching the next generation of clinicians and veterinarians how to apply and do their own work in such a way that many others come to appreciate the necessity of ‘One Health’ in tackling difficult problems.

As these two volumes of Current Topics in Microbiology and Immunology go to press, many countries have established their own national ‘One Health’ policies and/or committees, recognizing the need to integrate and coordinate their human and animal surveillance to empower a more effective and rapid cross-sectoral response to zoonotic disease threats. There is little doubt that the ‘One Health’ concept will continue to develop and provide the coordinated, collaborative, multidisciplinary, and cross-sectoral approaches essential to develop the rapid detection and better predictive ability so necessary for rapid response to future threats. In particular, we envisage a greater collaboration among environmental and ecological scientists with the animal and human health sectors of the ‘One Health’ movement. The linkages between the underlying socioeconomic and environmental drivers of emerging diseases, and the threat of pandemic emergence will likely be one area in particular where collaboration will be fruitful.

The purpose of these volumes is to present an overview of the ‘One Health’ movement, and in so doing, demonstrate the breadth and depth of its recent global development. The first volume has been divided into two parts. The first part entitled “The Concept and Examples of a One Health Approach” examines ‘One Health’ from different perspectives especially that of human health and veterinary medicine, whether domestic or wildlife, the importance of understanding the different interfaces, the role of ecological science, and the compelling economics driving their cooperation and coordination. This is then followed by a series of examples where a One Health approach has been useful in responding to specific diseases in the field. The second volume entitled “Food Safety and Security, and

International and National Plans for Implementation of One Health Activities” explores the importance of ‘One Health’ in food safety and food security. These are crucially important issues that are often not given the prominence they require and deserve as the world seeks to feed a growing population. This second volume also describes some of the international, regional and national activities and plans to implement ‘One Health’ approaches. The final section describes additional activities and approaches to strengthen the ‘One Health’ movement and increase its momentum in different ways. By reading, reflecting and acting on the scale and depth of ‘One Health’ as set out in these volumes, you will be making your own contribution to the movement. Do not underestimate the importance of that contribution.

One Health: The Human-Animal-Environment Interfaces
in Emerging Infectious Diseases

The Concept and Examples of a One Health Approach

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