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One Health

Robert Hall^{A,C} and David N. Durrheim^B

^ASchool of Public Health and Preventive Medicine,
Monash University

^BHunter Medical Research Institute

^CCorresponding author. Email: robert.hall@monash.edu

We are in an era when public health slogans abound; we have had ‘the new public health’, ‘emerging infectious diseases’, and now ‘One Health’ joins this lexicon.

So, what is ‘One Health’? How does this concept help us think through, and perhaps solve, public health problems? One Health places disease, particularly infection, in a broad ecological context. Many agents of infection target hosts beyond humans, and One Health seeks to understand and explain the public health implications of broad host ranges.¹ One Health is a modern restatement of the old epidemiological triad of host, agent and environment.

It has long been known that many infections cross the species barriers between humans, domesticated animals and wildlife. Our view of this has traditionally been somewhat compartmentalised; those who work in food production and regulation are aware of the importance of *Salmonella* infections and how modern intensive agriculture, food production, trade and marketing interact to determine their epidemiology. The more complex interactions between domesticated animals and wildlife that govern the spread of well-known infections such as influenza, rabies, Ross River and other arbovirus infections, and newly recognised infections such as Nipah and Hendra virus infection still tease expert minds.²

There are some specific puzzles. What determines pathogenicity of agents, with species specificity? What, in particular, makes bats an efficient vector of so many newly described infections? How do we determine whether an agent is a true pathogen? What factors determine whether an infection will cross a species barrier? What measures will most effectively limit the burden placed on veterinary and human health? The solutions to these problems will come

only from cross-disciplinary work involving epidemiologists, epizootiologists of both wild and domesticated animals, veterinarians, public health practitioners, laboratory scientists and clinicians.

The One Health concept is focused on infectious diseases and their transmission. However, this is not the only way that health can be affected across species. To date, we have focused largely on animal infection, but microbiological and plant infections also impact health. An example of a cross-species impact on health was potato blight with its first impact directly on plants, and a second impact through starvation of humans. Global warming is also predicted to have an enormous impact on agricultural production (most of which will not be due to infection), while having a secondary health impact on humans.

The One Health concept has largely been the domain of microbiologists and wildlife ecologists. More exploration and discussion of the epidemiological and epizootiological background is needed to characterise the importance of these infections to human and animal public health. This special edition of the *NSW Public Health Bulletin* begins to explore One Health issues of recent or emerging importance in New South Wales. Adamson et al reflect on the level of coordination that already exists between state health, veterinary and primary industry players, and Dwyer et al demonstrate how this partnership strengthened the response to the 2009 influenza pandemic and calls for expansion of these collaborative efforts. Hendra virus is a classic example of an emerging infectious disease with potentially profound human and animal health consequences, and Hess et al provide practical management advice while highlighting the need for a One Health partnership to gain a better understanding of this virus and its ecology. Paterson et al argue that current surveillance systems do not provide reassurance for early detection and characterisation of emerging pathogens that present with an encephalitis syndrome. Their argument for a standardised algorithm for diagnostic work up would allow the remarkable developments in virological science, elucidated by Wang, to rapidly

Box 1. The first International One Health Congress

The first International One Health Congress was held in Melbourne on 14–16 February 2011 with the aim of exploring the interdependencies between human, animal and wildlife health. Over the 3 days of the Congress, about 150 papers were presented on these issues, and the Congress concluded that a practical program of collaboration was needed to address the scientific, policy and social questions raised by these interdependencies.

An overview of the Congress and copies of the papers are available at the Congress website at: <http://www.onehealth2011.com/index.php>

characterise new pathogens, to be harnessed for directing human and veterinary public health action.

NSW Health staff recently contributed to the first International One Health Congress. Box 1 contains a link to the Congress website where copies of the papers presented are available for further information. Also presented is a glossary to assist the reader with terms that are used in this issue (Box 2).

Emerging disease threats demand a team approach that capitalises on the complementary expertise and knowledge of animal and human health professionals. The One Health approach has the potential to improve the lives of all species, whether human or animal.

An update on Hendra virus infection from the Editors

Hendra virus infection is carried by Flying-foxes in Australia. Occasionally the infection is passed to horses, presumably through exposure to virus excreted by Flying-foxes. There have been seven human infections with Hendra virus (including four deaths) identified in Australia to date, all following significant exposures to infectious horses. No human infections have followed direct exposure to a Flying-fox or another person with the infection.

On 1 July 2011, the NSW Department of Primary Industries reported a confirmed case of Hendra virus infection in a horse that had died on a property near Wollongbar on the NSW North Coast. On 6 July, the Department of Primary Industries reported a second unrelated Hendra virus infection in a horse that died on a property near Macksville on the Mid North Coast. The horses were buried and the properties placed in quarantine. Several Queensland properties were also quarantined around the same time following confirmation of unrelated Hendra virus infections in horses there.

Nine people were identified as having potential contact with the first NSW horse while it was potentially infectious, and six with the second horse. NSW Health urgently convened expert panels including public health and infectious disease expertise from NSW and Queensland after the diagnosis was confirmed in each horse and the contacts

Box 2. Glossary of terms used in this issue

Ardeid waterbirds: the Ardeidae family of birds encompass the herons, egrets, night herons and the bitterns. They are geographically widespread and are found on all continents (except Antarctica) and islands around the world. These birds feed in water and usually live in wetlands, including swamps but also near tidal areas and streams. They like to roost and build their nests in trees. (<http://tolweb.org/Ardeidae/26331>)

Enzootic: of, relating to, or denoting a disease that regularly affects animals in a particular district or at a particular season. (*Oxford Dictionary*)

Epizootiology: the study of the character, ecology and causes of outbreaks of animal diseases. (*Webster Medical Dictionary*)

Novel virus: newly discovered virus.

One Health: the collaborative effort of multiple disciplines – working locally, nationally and globally – to attain optimal health for people, animals and our environment. (American Medical Veterinary Association)

Vector: in infectious disease epidemiology, an insect or any living carrier that transports an infectious agent from an infected individual or its wastes to a susceptible individual or its food or immediate surroundings. The organism may or may not pass through a developmental cycle within the vector. (*A Dictionary of Epidemiology*, 4th edition – John M. Last)

Zoonosis: an infection or infectious disease transmissible under natural conditions from vertebrate animals to humans. Examples include rabies and plague. May be enzootic or epizootic. (*A Dictionary of Epidemiology*, 4th edition – John M. Last)

had been interviewed. The panels evaluated the risk of infection to each person based on their exposures to the horses according to national protocols (see: <http://www.health.nsw.gov.au/factsheets/guideline/hendra.html>).

All 15 potential contacts were assessed as having had either no, negligible, low or medium level risk of exposure to the infectious horses. All previous human Hendra virus infections have occurred following high level exposures to infected horses. North Coast Public Health Unit staff counselled contacts about their risk and the disease, and initiated symptom monitoring for the incubation period for Hendra virus infection in humans (3 weeks from last exposure).

For further information on Hendra virus infection see: <http://www.dpi.nsw.gov.au/agriculture/livestock/horses/health/general/hendra-virus> and <http://www.health.nsw.gov.au/factsheets/infectious/hendra.html>

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