One Health: the small animal dimension

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Feature

ONE MEDICINE

One Health: the small animal dimension

Earlier this year, the World Small Animal Veterinary Association (WSAVA) established a One Health committee with the remit of positioning small companion animals in the global One Health framework. Here, Michael Day, the chairman of that committee, explains how companion animals fit within the One Health concept.

‘ONE Health’ or ‘One Medicine’ proposes the unification of the medical and veterinary professions with the establishment of collaborative ventures in clinical care, surveillance and control of cross-species disease, education, and research into disease pathogenesis, diagnosis, therapy and vaccination. The concept encompasses the human population, domestic animals and wildlife, and the impact that environmental changes (‘environmental health’) such as global warming will have on these populations (Monath and others 2010).

The concept is not a new one as a number of enlightened individuals historically practised One Health and are regarded as the initiators of this field. In 2011, we celebrate the 250th anniversary of the foundation of the first veterinary school in Lyon by Claude Bourgelat, who wrote ‘We have realised the intimacy of the relation which exists between the human and the animal machines; this relation is such that either medicine will mutually enlighten and perfect the other when we discard a derisory, harmful prejudice.’

The greats of 19th century medical research, Louis Pasteur (1822-1895), Robert Koch (1843-1910) and Rudolph Virchow (1821-1902), all investigated animal disease, with Virchow stating ‘Between animal and human medicine there is no dividing line – nor should there be. The object is different but the experience obtained constitutes the basis of all medicine.’

In the UK, an early proponent of One Health was Sir John McFadyean (1833-1941) who was dually qualified as both a veterinary surgeon and medical physician and undertook research into major zoonotic diseases, largely at the Royal Veterinary College in London (Pattison 1988). Sir John also founded the Journal of Comparative Pathology (1888), which remains an important vehicle for dissemination of such research (Day 2008).

Rediscovering One Health

The ‘rediscovery’ of the One Health concept is widely attributed to the veterinary epidemiologist Calvin W. Schwabe (Cardiff and others 2008). Academia, government and industry now well recognise the value of collaboration between human and veterinary physicians and scientists for the benefit of both man and animals in areas as diverse as experimental medical research, public health, food and environmental science, and bioterrorism. Numerous recent initiatives have occurred in this area. In 2005 the British Medical Association and the British Veterinary Association co-published complementary volumes of the British Medical Journal and the Veterinary Record, highlighting the links between the professions (Alder and Easton 2005). The theme of the 2007 American Veterinary Medical Association (AVMA) convention was One Health, following from the liaison established in 2006 between the AVMA and the American Medical Association (AMA) (Enserink 2007). The keynote lecture at the 2005 forum of the American College of Veterinary Internal Medicine was entitled ‘One Health, One Medicine: a common pathway for veterinary and human medicine’, and One Health was a recurrent theme at the 2008 International Conference on Emerging Infectious Diseases.

The UK Comparative Clinical Science Foundation has been established to promote and fund research into diseases affecting both man and animals (www.onemedicine.org.uk) and in 2009 this group hosted a symposium in London attended by over 100 UK medical and veterinary researchers (Anon 2009a). In Europe, major European Union funding has been allocated to the LUPA project, a genomic study of canine diseases that may model equivalent human disorders (Pennisi 2007) (www.eurolupa.org), and the Federation of Veterinarians of Europe (FVe) and the World Small Animal Veterinary Association (WSAVA) have both adopted the One Health theme.

The most significant recent initiative has been the focus on One Health by a consortium of the World Organisation for Animal Health (OIE), the World Health Organization (WHO), the Food and Agriculture Organization (FAO), the United Nations Children’s Fund, the United...
The award of US$10 million by the Gates Foundation to the WHO Department of Control of Neglected Tropical Diseases for a study of rabies control focusing on elimination of the disease in the dog.

Leishmaniosis is a similarly significant human disease endemic in many countries and for which the domestic dog is the major reservoir of infection. Although not accorded the same significance as rabies, control of the disease in the canine population (by vaccination and stray dog control) is crucial. First generation Leishmania vaccines are now available in Brazil and appear effective in the field (Palatnik-de-Sousa and others 2009). The WHO also regards leishmaniosis as a neglected disease. The disease is present in 88 countries (72 of them are developing nations) and there are an estimated two million new human cases each year, with an estimated 12 million people currently infected.

Rabies and leishmaniosis are also excellent examples of the interaction between domestic pet animals and wildlife, with the urban fox having a niche as a reservoir of both infections.

Although these provide two clear examples of small companion animal diseases of global significance, the close relationship between pet animals and man creates potential for transmission of many diseases.

Many emerging infectious diseases might potentially cross species barriers into dogs and cats and these animals may become a focus for disease control. Examples of the potential of this scenario are provided by the susceptibility of cats to infection with the SARS coronavirus (van den Brand and others 2005) and emergent strains of influenza including highly pathogenic H5N1 (Kuiken and others 2004, Marschall and Hartmann 2008) and H1N1 (Lohr and others 2010). Companion animals are also susceptible to infection by West Nile virus, Nipah virus, Hendra virus and others. The full range of small companion animal zoonotic infectious diseases is reviewed in an excellent new textbook devoted to this subject (Rabinowitz and Conti 2010).

The risk of emergent zoonotic infection in companion animals is now compounded by the unprecedented increase in the global movement of these species through international pet travel schemes (Brown 2010). For example, the cumulative total of cat, dog and ferret movement under the UK Pet Travel Scheme since its introduction in 2000 was 717,965 to the end of August 2010 (Anon 2010b). Companion animal veterinarians must therefore be vigilant in disease surveillance in these species.

In developed nations a further example of disease that has attracted much attention is meticillin-resistant Staphylococcus aureus (MRSA) infection and the realisation that these resistant organisms may infect companion animals (generally considered a transmission from man to animal).

Apart from these examples of direct interaction between human and small companion animal health, another major aspect of One Health is the integration of research efforts. It is widely recognised that the study of spontaneously arising canine and feline diseases holds great potential for understanding the human counterparts. Dogs and cats develop a wide range of infectious, neoplastic, inflammatory and immune-mediated diseases that are close mimics of disorders of man. The availability of the canine genome has allowed rapid progress to be made in recent years in such research and we are beginning to see the publication of ‘genome-wide association studies’ characterising the precise genetic basis for canine diseases with human correlates (Mellors 2008, Wilke and others 2010). Many of these diseases, in both man and dogs, are multifactorial with increasing recognition of the role of lifestyle and environmental influences. As both species intimately share a domestic environment, there are further aspects of comparative research that are ripe for investigation (Bernstein and Shanahan 2008). Probably the most important health issue of man and pets in western countries is the shared epidemic of obesity that is often directly related to aspects of this shared lifestyle.

The final aspect of One Health with direct relevance to small companion animals involves the very important and widely discussed area of the ‘human-companion animal bond’. The direct benefit to human health and wellbeing from association with pets is now well established in areas as diverse as child rearing, recuperation from chronic disease and care of the elderly.

WSAVA One Health committee

Given this clear significance of small companion animals for human health, it is surprising that many One Health platforms focus almost entirely on the interaction between man, production animals and wildlife species. In order to redress this balance the WSAVA has recently established a One Health Committee, which has as its major remit the positioning of small companion animals within the global One Health framework.

The WSAVA is a unique organisation that is a point of contact for almost 80 national small animal veterinary associations representing almost 80,000 small animal practitioners throughout the world. The fundamental remit of the organisation is in scientific education, which it achieves through an annual congress and by taking a programme of education into developing nations. The delivery of such education can already be regarded as a major
contribution to One Health as practitioners in developing nations are on the front line when it comes to existing and emerging infectious diseases that cross species barriers. The WSAVA is therefore uniquely positioned to be able to rapidly contact and coordinate the efforts of the global small animal veterinary community, particularly those practitioners working in developing nations. For example, many of the WSAVA member nations are countries in which rabies and leishmaniosis are endemic diseases. The single most important role that the WSAVA might play in the arena of One Health would be to establish a really strong and effective global communications network. This might serve as an effective means of rapidly disseminating scientific information (for example, in the case of a global disease pandemic involving companion animals), or initiating new disease control programmes, and could be of great benefit to organisations such as OIE.

The global communication of scientific information in this way has been proved through the international adoption of new guidelines for canine and feline vaccination produced by the WSAVA Vaccination Guidelines Group (Day and others 2010). Given appropriate funding, it would also be feasible for the WSAVA to coordinate global small companion animal infectious disease surveillance through sentinel practices or diagnostic laboratories in member nations contributing data to a central database.

A second activity of increasing importance for the WSAVA has been in coordinating scientific progress through its standardisation groups. The diseases that are the current subject of these activities involve the liver, gastrointestinal tract and kidney, and in all of these areas there are canine and feline disorders that provide excellent spontaneously arising models of human disease (Day and others 2005). While the WSAVA supports only clinical (rather than experimental) research, there is enormous scope for greater integration of human and veterinary clinical research. As a direct example of this, the WSAVA Liver Standardization Group included among its membership a human hepatologist. The WSAVA has now established a standalone Foundation which will allow development of such shared scientific knowledge.

The WSAVA recognises the significance of One Health and actively supports all of the current initiatives that are in play. The association believes that it has a potential role as global coordinator for small companion animal veterinarians to expand and promote their role in the One Health concept. For this reason, the WSAVA adopted One Health as a key focus during its recent 50th anniversary year.

The association has now established a One Health Committee (Table 1) that will commence a three-year cycle of activity with an inaugural meeting in January 2011. This work has been generously supported through the WSAVA Foundation by a consortium of industry sponsors. The foundation members of the committee have internationally recognised expertise in small companion animal zoonotic infectious disease, vaccinology and comparative research. The committee includes representatives from the OIE and CDC and is in discussion with the WHO at the time of writing. These organisations have all recognised the potential that lies within the WSAVA global network for redressing the omission of small companion animals from the One Health concept.

Table 1: Foundation members of the WSAVA One Health Committee

<table>
<thead>
<tr>
<th>Member</th>
<th>Country</th>
<th>Representation/scientific expertise</th>
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<tbody>
<tr>
<td>Michael J. Day (Chair)</td>
<td>UK</td>
<td>Chairman WSAVA Scientific Advisory Committee Chairman WSAVA Vaccination Guidelines Group Comparative research</td>
</tr>
<tr>
<td>Sarah Cleaveland</td>
<td>UK</td>
<td>Rabies in domestic dogs and wildlife</td>
</tr>
<tr>
<td>Chand Khanna</td>
<td>USA</td>
<td>Comparative research, National Institutes for Health Bethesda</td>
</tr>
<tr>
<td>Michael Lappin</td>
<td>USA</td>
<td>Feline zoonoses</td>
</tr>
<tr>
<td>Clarissa Palatk-de-Sousa</td>
<td>Brazil</td>
<td>Leishmaniosis</td>
</tr>
<tr>
<td>Carol Rubin</td>
<td>USA</td>
<td>Associate director for Zoonoses and One Health, CDC Atlanta</td>
</tr>
<tr>
<td>Diane Sheahan</td>
<td>Australia</td>
<td>WSAVA Board and first opinion small animal practitioner</td>
</tr>
<tr>
<td>Alex Theissmann</td>
<td>France</td>
<td>President of the Terrestrial Animal Health Code and adviser to the Director General of the OIE, Paris</td>
</tr>
<tr>
<td>Ed Breitschwerdt (affiliate member)</td>
<td>USA</td>
<td>Zoonoses</td>
</tr>
<tr>
<td>Thyss Kuiken (affiliate member)</td>
<td>The Netherlands</td>
<td>Influenza and wildlife</td>
</tr>
<tr>
<td>Jennifer McQuiston (affiliate member)</td>
<td>USA</td>
<td>Rickettsial Zoonoses Branch, CDC</td>
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