Collaboration between doctors and veterinarians for the greater good of all species

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160 character Summary: Improved collaboration between doctors and veterinarians is needed to tackle challenges facing human and animal health. This article discusses the history and importance of One Health.

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Abstract

The One Health Initiative was founded to improve collaborative clinical and research efforts between medical, veterinary and environmental experts. Human and veterinary medicine share common issues and challenges, such as zoonotic diseases and antimicrobial resistance. However, the fields of human and veterinary medicine are largely divided and collaboration is limited. An interdisciplinary approach may be effective in overcoming the challenges common to both human and animal health. To improve communication and teamwork between the two fields, interdisciplinary education could be introduced into both veterinary and medical school curricula. Medical and veterinary students should consider how collaboration could benefit their education and their future patients.

Introduction

“Between animal and human medicine there is no dividing line – nor should there be” – Rudolf Virchow [1].

The One Health Initiative is an international movement encouraging interdisciplinary collaboration between human, animal and environmental experts in order to improve the lives of all species [2]. While there are clear differences between human and animal medicine, both disciplines share a common body of knowledge in anatomy, physiology, pharmacology and pathology. More importantly, doctors and veterinarians share the common goal of improving the quality of life of their patients. Increasing collaboration between these two professions may allow doctors and veterinarians to better achieve this goal.

History and Development of One Health

The concept of One Health was first described as early as the late 19th century. Rudolf Virchow was the first to propose a close link between human and animal health. Virchow coined the term “zoonosis” to describe infectious diseases that are transmissible from animals to humans, and suggested that there should be no distinction between human and veterinary medicine [3]. William Osler, Virchow’s student, continued this theme. Osler taught both veterinary and medical students, published on comparative pathology, and was a promoter of the “One Medicine” concept [4]. Unfortunately, with the expansion of both fields in the 20th century, the divide between veterinary and human medicine grew [4].

In order to rebuild and strengthen the relationship between doctors and veterinarians, the American Medical Association (AMA) and American Veterinary Medical Association (AVMA) endorsed the concept of One Health in 2008 [2]. The AMA and AVMA have pledged to improve communication between the two professions, develop joint educational programs, and build cross-species research collaborations [2]. In Australia, the Australian Veterinary Association (AVA) is working to increase awareness of the One Health Initiative [5]. However, the Australian Medical Association is yet to publicly endorse this concept. The Australian Medical Association and AVA should consider implementing a joint One Health taskforce similar to that of their counterparts in the United States.
Importance of One Health

A One Health approach is particularly relevant to the major health issues of zoonotic diseases and antibiotic resistance. It has been estimated that 60-75% of emerging infectious diseases are zoonotic [6, 7]. These diseases are a significant health and economic burden [6, 7]. Five of the top six ‘category A’ disease agents identified as a potential bioterror threat by the Centers for Disease Control and Prevention (CDC) are zoonoses [8]. Given the critical role of animals in the epidemiology of these diseases, the effective control of zoonoses requires research in both human and animal populations conducted by multidisciplinary teams. This integrated research is currently lacking [9].

Antimicrobial resistance (AMR) is another major health issue with significant consequences. The sub-therapeutic doses and long exposure periods used in animal production systems may create the ideal circumstances for microbes to develop resistance to antibiotics [10, 11]. This resistance can be transmitted to human pathogens or to human microbiota [10, 11]. The World Health Organisation suggests that a multidisciplinary effort is required to effectively halt antimicrobial resistance [12-14]. In 2002, Canada became one of the first countries to develop a joint programme for the surveillance of antibiotic resistance in humans and animals [15]. In 2015, all WHO Member States committed to developing a multidisciplinary national action plan to tackle AMR. Seventy-nine countries had a finalised plan by 2017 [13, 14]. The Australian Government has published the National Antimicrobial Resistance Strategy, outlining their response to the threats of antibiotic misuse and resistance. The Australian AMR Steering Group is co-chaired by the Australian Chief Medical and Chief Veterinary Officers. One of the goals of the AMR Strategy is to establish and maintain linkages between the medical, veterinary and environmental sectors. The Steering Group recognises that collaboration between medical and veterinary boards, and professional colleges and societies, is vital to ensure the AMR Strategy is executed effectively [16].

One Health in Action

There are several examples of scientific breakthroughs made from research collaborations between doctors and veterinarians. One such example goes back as early as 1893, when Theobald Smith, a doctor, and F. L. Kilbourne, a veterinarian, discovered that ticks were responsible for the transmission of babesiosis [17]. In the late 20th century, Hendra virus was first described in Australia following an outbreak of fatal equine and human cases in Queensland [18]. In response to the outbreak, the Queensland Government quickly established an expert taskforce to identify the natural host of the virus [18]. The successful taskforce included animal and human clinicians and scientists, as well as a number of other experts from a range of disciplines. Some of the key people from this taskforce attribute the advances in knowledge they made to the diversity of the group and the mutual respect they shared [18]. These are just two historical examples of human and veterinary medical professionals collaborating to discover new scientific knowledge that can be applied across species.
More recently, the Duke Comparative Oncology Group, made up of veterinarians, doctors and scientists, was created with the goal of using a cross-species approach to improve the treatment of soft tissue and bone sarcomas [19]. The genetic profiles of canine and human osteosarcomas have been shown to be very similar, providing a unique opportunity for cross-species research [20]. Companion dogs develop osteosarcoma in similar sites to humans, with similar histology, response to traditional therapies, and risk of metastasis [20]. However, over 10,000 new cases are diagnosed in dogs every year while only 800 new cases of osteosarcoma are diagnosed in humans annually [20]. Given the greater number of cases and the accelerated biology of osteosarcoma in dogs, there is an opportunity to increase the rate of research into this disease by using both canine and human populations compared to research conducted in humans alone [20]. Collaborative research between medical and veterinary professionals has the potential to discover novel treatments for osteosarcoma for the benefit of human and animal patients.

In addition to combined research groups, interdisciplinary clinical teams are becoming increasingly common. Human and animal conditions have historically been treated as separate entities. However, some interdisciplinary teams are working to rectify this divide. In Los Angeles, specialist physicians from the University of California-Los Angeles (UCLA) Medical Centre consult on veterinary cases at the Los Angeles Zoo and sit on the zoo’s Medical Advisory Board [21]. In several American academic hospitals, doctors invite veterinarians to their ward rounds and vice versa [21]. In 2011, the Zoobiquity Conference was launched with the aim of bringing doctors and veterinarians together to discuss clinical cases and solve the shared challenges facing human and veterinary medicine. These examples highlight the steady progression of interdisciplinary collaboration under the One Health Initiative.

**Introducing One Health to Students**

One possible strategy for improving the level of collaboration between doctors and veterinarians is to introduce interdisciplinary group projects into the curricula of medical and veterinary schools. This would foster teamwork and early networking between veterinary and medical students. Similar projects are already being implemented in the United States. The Zoobiquity Research Initiative pairs UC-Davis veterinary students with UCLA medical students to work collaboratively on projects affecting animal and human health [21]. Encouragingly, Edwards et al. [22] reported that medical student attitudes towards collaborative learning were more positive after an interdisciplinary surgical skills session with veterinary students.

It is important to note that there are logistical challenges in implementing such a system in Australia. In particular, there are a disproportionate number of medical students compared to veterinary students. There are 21 medical schools compared to only seven veterinary schools nationwide. In Victoria alone, there are more than 3000 medical students compared to only 500 veterinary students [23, 24]. However, five of the seven Australian institutions with veterinary schools also have a medical school. These are James Cook University, University of Adelaide, University of Melbourne, University of Queensland, and University of Sydney. It may be more feasible for these institutions with co-located veterinary and medical schools to introduce collaborative learning.
A pilot study trialing collaborative learning between medical and veterinary students in Australia would provide insight into the feasibility and potential benefits of such a program. Rabies and tuberculosis are two potential project topics that would emphasise the importance of collaborative work in achieving successful outcomes for human and animal populations. Projects exploring the similarities and differences between the pathogenesis and treatments for common diseases affecting both animals and humans, such as cancer or heart disease, would help medical and veterinary students appreciate the clinical challenges shared by both fields. These learning exercises will encourage medical and veterinary students to consider how a collaborative approach might benefit their future patients, while also providing an early networking opportunity.

**Conclusion**

The current lack of collaboration between doctors and veterinarians represents a missed opportunity to benefit from interdisciplinary research and clinical practice. To seize this missed opportunity, Australian medical and veterinary schools should consider incorporating the One Health Initiative into their curricula. Medical and veterinary students should be encouraged at this early stage of their careers to consider how their future patients could benefit from interdisciplinary collaboration. Given the complex challenges facing humans and animals today, it is critical to recognise the connection between human and animal medicine. Improving communication between the two currently divided disciplines would be a good starting point in fostering the collaboration required to tackle our shared challenges.
**References**

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