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Veterinary education, zoonoses and public health: a personal perspective

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Abstract

Zoonotic disease poses an important threat to human public health and should therefore be taken seriously. A number of zoonoses also cause severe disease and loss of production in food producing animals. Many veterinarians are less aware of the importance of zoonoses than is desirable and medical clinicians who encounter zoonoses in human patients may either fail to recognise them or concentrate on treating the individual patient rather than disease control. This situation may be exacerbated where there is inadequate communication between veterinarians, the various health care professionals and public health organisations. Undergraduate and postgraduate training courses must promote a greater understanding of the importance of zoonoses and of how to investigate and control them. We also need to increase awareness amongst qualified veterinary personnel and human health care workers and to facilitate inter-disciplinary discussions and collaborative ventures. This paper suggests some ways to achieve these aims.

Keywords: Education; Epidemiology; Public health; Veterinary; Zoonoses; Collaboration

1. Introduction

Zoonoses are human diseases that can be acquired by infection from animals of another species. They are mentioned in medical textbooks on communicable disease — e.g. Benenson (1995) and Bennett and Buga, (1993) — and they are given considerable prominence in veterinary textbooks such as Schwabe (1984). There can be little doubt that the majority of veterinarians and human health professionals have a basic knowledge about zoonoses and have some theoretical understanding of the threat that they might pose to human health. But it is also apparent that in practice many health workers either fail to consider the possibility that they may be dealing with a zoonosis or ignore the public health implications of this type of infection. In addition, the significance or potential significance of zoonoses is often ignored by public health policy and limited resources are available to investigate them.

This paper explores some ways in which we are trying to improve the situation.

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2. Why zoonoses are important

There are four main reasons why zoonoses need to be considered as serious threats to public health rather than merely as interesting examples of the natural history of some infectious agents.

Firstly, a disease that starts as a zoonosis may have the potential to develop into a major human communicable disease. Bennett and Begon (1997) discuss this in more detail for viral infections. The use of elementary mathematical modelling suggests that for some communicable diseases the infection cannot sustain itself in the human populations below a critical minimum population size and density and that appropriate conditions were not met before the last few thousand years. As a result these communicable diseases must originally have been contracted from another species and hence be zoonoses. Whilst this is not likely to be true for all human communicable disease it is almost certainly the case for a number of important ones such as measles. There is also strong evidence to suggest that other communicable diseases, such as influenza, may have originated from non-human animals. Indeed it now seems certain that the current Acquired ImmunoDeficiency Syndrome (AIDS) pandemic originated as a zoonosis but that the Human Immunodeficiency Virus is now able to maintain itself entirely within the human population. The conclusion from this is that zoonoses must be considered seriously as possible future human communicable diseases, and that ignoring them will pose a threat to public health.

Secondly, many zoonoses are able to cause very significant human morbidity and mortality. Amongst these are brucellosis, leptospirosis, salmonellosis, tuberculosis and echinococcosis, and a large number of other bacterial, viral and parasitic infections. In many countries the impact of zoonotic disease has hardly been investigated at all so it is difficult to estimate their contribution to human illness.

Thirdly, some zoonotic infections also cause serious disease in agricultural and food-producing animals. This can result in a reduced availability of animal-derived food and reduced wealth in animal-owning communities: and this in turn can adversely affect the level of public health. An example of this is tuberculosis. One of the major reasons for conducting a programme to eradicate this disease from cattle in the UK was because of the barrier it imposed to the intensive production of cattle: in some ways the reduction of disease risk to humans was considered to be a beneficial side-effect of the programme.

Many countries have made attempts to rid their animal populations of one or more zoonotic infections and in some cases these attempts have appeared to be successful. Experience has shown, however, that infections which have been reduced to a very low prevalence may be able, once control measures are relaxed, to reappear. This demonstrates the fourth reason that zoonoses are important: ignoring zoonoses does not cause them to go away, and new ones may emerge at any time. The only way to have any level of protection against them is to be constantly vigilant.

3. Problems in research and education

The Veterinary Epidemiology Group at Liverpool University has been studying aspects of zoonoses or potential zoonoses for over 10 years and our interests have included a variety of bacterial and viral diseases as well as spongiform encephalopathies. Our experience suggests that there is a lack of awareness amongst agencies which fund veterinary research, professionals in the scientific and health care communities and at ministerial level about the public health consequences of zoonotic disease. This lack of awareness may be partly due to deficiencies in education. Indeed, this certainly appears to be true of veterinary training in England. The training of veterinary students includes Epidemiology, Microbiology, Parasitology and Preventive Medicine. Our students are used to the concept of transmission of diseases between species, and they know about infections that can be acquired by humans from animals. In addition they are taught how to alter the management and husbandry of animals in

order to control disease. Veterinary graduates should therefore be ideally suited to deal with zoonoses.

However even if they have the theoretical knowledge of the subject many of our veterinary graduates may not appreciate the relevance or importance of zoonoses. There can be little doubt that this situation is at least partly caused by the way that the subjects are taught. The English veterinary schools do teach Public Health but the subject tends to refer almost exclusively to meat inspection, meat hygiene and food hygiene: little emphasis is placed on the veterinary role in wider aspects of public health such as zoonoses, water quality and human nutrition. This means that although our veterinarians graduate with the appropriate knowledge, many lack the understanding and awareness to look for, recognise, prevent and control zoonotic diseases. Similarly, human health care professionals are often unused to including zoonoses in their list of differential diagnoses. In these circumstances it is hardly surprising that there tends to be a large degree of public ignorance of the risks of zoonotic infections and the ways to control and prevent them. In the UK, for instance, we have many regulations which aim to reduce the risk of contracting infections from animals but individual members of the public have very limited understanding of why they need to protect themselves and how to do so.

Experience of all these problems leads to a general conclusion that although a small proportion of professionals in the veterinary and health fields may not know what zoonoses are, most do. However, a large proportion do not think of zoonoses as being relevant to their normal work.

An additional complication is that in many there is little effective communication between the veterinary and human health arms of government. This has been the case in the UK and is also true of many West African Countries. As a result even in countries (such as Ghana) where there is a high level of zoonosis-awareness amongst veterinarians, this may not be communicated to the personnel involved in human public health.

4. Solutions: education and collaboration

At Liverpool we have approached the problem of Veterinary Education in two ways. We are redesigning the undergraduate course to include Veterinary Public Health which will be taught using a 'Problem Based Learning' type of approach. A major part of the course will deal with zoonotic infections and we hope that by doing this we will allow our students to graduate with an attitude which encompasses the importance of these diseases. We also offer a veterinary module in the Master of Public Health course run by the Faculty of Medicine. The module focuses on the investigation, control and prevention of zoonoses and it is hoped that this approach will benefit both veterinarians and human healthcare personnel.

A similar approach has been used by the University of Ghana, Legon, where veterinarians are included on the Masters of Public Health course. Reports suggest that this has resulted in a very greatly increased awareness of zoonoses amongst those professionals involved primarily in human health who are also taking the MPH course.

Another strategy is to promote inter-disciplinary research and meetings, so that trained professionals can pool their resources and experience and increase their understanding. This is beginning to happen in the UK: meetings on zoonoses are becoming more common and there are a number of collaborative research projects which have started to produce useable results.

5. Conclusion

The problem of zoonoses is multi-factorial and one of the major constraints that all organisations have in controlling zoonoses is the lack of resources. However, much can be done by education, and in particular by increasing the awareness of different health professionals, and facilitating communication and collaboration between veterinary, public health and agricultural personnel. This will help us to approach and control zoonotic diseases in as efficient and effective a way as possible.

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