"I think if we have healthy animals we'll have healthy people"

- A qualitative study exploring the perceptions of zoonotic diseases and the One Health concept among veterinarians and medical doctors in Stockholm, Sweden

Smittsamma zoonotiska sjukdomar ökar världen över och det finns en önskan om ökat samarbete mellan olika yrkesgrupper för att arbeta tillsammans för One Health. Flera forskningsstudier har gjorts inom området, men det är svårt att hitta kvalitativa studier angående uppfattningen om zoonotiska sjukdomar och One Health hos veterinärer och läkare. Målet med denna studie är att titta på skillnaderna mellan läkare och veterinärer och deras uppfattningar om zoonotiska sjukdomar och One Health. Studien utgör författarens skriftliga arbete för en mastersexamen i folkhälsa vid Uppsala Universitet.

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Zoonotic diseases are defined as diseases that are transmissible between humans and animals, and contribute to the global burden of disease by making up more than 65% of diseases diagnosed in humans (1,2).

'One Health' is a transdisciplinary collaboration concept designed to create and implement policies, legislations, guidelines, programmes and research across several disciplines to achieve improved public health worldwide (3). The One Health concept incorporates many fields of expertise, including veterinarians, medical health professionals and both environmental and sociological scientists (4). It has in recent years grown and been implemented in many low-income countries during disease outbreaks and to further develop policies to minimise future risks (5).

Currently there is limited knowledge regarding doctors' and veterinarians' thoughts and understanding on the subject.

Most commonly, zoonotic infections are due to direct or indirect contact with livestock, companion animals, or by consumption or use of animal products (6). These infections have been somewhat ignored in the past, as they were listed as 'other diseases' under the Millennium Development Goals (7). The lack of focus on zoonotic diseases could possibly be due to them falling across two fields; veterinary and human medicine, however, zoonotic diseases are getting more attention in recent years, especially now with the ongoing Covid-19 pandemic (1,8–10).

There has been an rise in zoonotic disease transmission world-wide due to increased movement of humans and animals across the globe, a larger trade of animals and animal products and an overall increase of the global animal population to meet protein demands as well as the growing popularity of owning pets (11, 12).

It has previously been suggested that veterinary and medical professionals should work together toward a reduction in zoonotic disease transmission and increased disease prevention, but also to educate the public about zoonotic diseases (4, 11). But there is research showing that this transdisciplinary collaboration is limited worldwide despite the One Health agenda (4).

Veterinarians encounter zoonotic diseases regularly in their workplace through direct contact with animals and research shows that veterinarians often speak to clients about zoonoses and the risks of contracting such a disease, more so than medical doctors (13–15).

Even though the overall prevalence of zoonotic disease appears to be increasing, little is known about the zoonotic disease prevalence in hospitals. Hospitals should and can rapidly diagnose and treat infectious diseases, including zoonoses, but if medical professionals are not trained effectively and do not use appropriate control measures, zoonoses may go undiagnosed (16).

Currently, the literature supports that medical doctors do not feel equipped to deal with zoonoses nor to guide patients on the subject of zoonotic diseases (4, 15, 17). In a study conducted in Ontario, Canada, 20% of pet owners had been given information about zoonotic diseases from their general practitioner, and 73% had gotten this information from their veterinarian. Concerningly, only 25% of the pet owners had ever been asked by their family physician if they owned a pet (17). This needs to be investigated further as improper medical history taking may delay diagnosis, result in misdiagnoses and inhibit appropriate treatment. With zoonotic infections being a common cause of infectious diseases in humans, it appears that it would be important for medical doctors to incorporate information about pet ownership or animal contact when seeing sick patients. Due to the close relations humans have with animals, it has been suggested that it would be important that health care professionals obtain a thorough medical history and ask

questions about possible animal contact or ownership (18). This is especially important when examining a high risk patient with a suspected infection of zoonotic potential, in order to determine an aetiology, but also to educate about how to minimise future disease transmissions (19).

MATERIALS AND METHODS

To enable identification of the participant's perceptions, as well as their personal and professional experiences, a qualitative study design using in-depth interviews was chosen.

The use of qualitative studies in veterinary medicine is relatively new where quantitative methods have previously been predominant (20). In human health, it has become evident that qualitative studies play a vital role. Research within the veterinary field have suggested that this type of method plays an equally important role within their discipline (20–22).

This study was performed in Stockholm, Sweden in February 2018.

Participants

Medical doctors at a Stockholm general practice, emergency physicians and veterinarians at a small animal hospital were invited to participate in this study. All invitees willing to participate were included. The medical doctors were either working in general practice or in an emergency department of a hospital. Professionals from these fields were invited as they often have the first encounter with the patient (23). Physicians with specialty training in infectious or emerging diseases nor students were invited to participate

The participants ages ranged from 25 to 70 years old, both women and men. Their professional experience spanned from newly graduated to 45 years in practice.

Twelve interviews were conducted by the author, which included all participants.

Data collection

In-depth interviews were conducted by the author using open-ended questions about their experiences and knowledge of zoonotic diseases and One Health, and how it could be practiced clinically.

Data Analysis

The results were analysed using thematic analysis to focus on presenting the key findings of the data collected. This method is beneficial when analysing the typical responses and group patterns into themes (22).

Categories were identified by creating meaning units made up by one to two sentences which were generated from the text (24). These sentences still contain the content of the text despite being shortened and then given a code. This code describes what the meaning unit is about and were grouped in categories and sub-categories based on the findings (22,24).

RESULTS

Five main categories were identified in the analysis: (1) One Health perceptions and knowledge, (2) The consideration of a transdisciplinary approach to One Health, (3) Patient history taking, (4) Zoonotic disease perception, and (5) A shared responsibility.

One Health perception and knowledge

No medical doctor in this study knew what the One Health concept was and confessed to having no training in this field. Despite being trained in the individual zoonoses' effect in people, they had only had one lecture on the concept of zoonotic diseases. All medical doctors brought up the suggestion of adding this topic into the curriculum to be better prepared for the future.

"When it comes to zoonotic diseases I am, as said previously, not very good at it, that I can't proclaim. There is not a major focus on this during our medical training. I discussed this with my partner, who is also a doctor, we had one lecture that is only remembered because it was so bad." Medical doctor.

All veterinarians were familiar with One Health and most could briefly speak about it. They liked the idea of a collaborative approach to public health, but unsure how it would work practice.

"When it comes to this One Health idea I think if we have healthy animals we´ ll have healthy people, and it will definitely take a lot of strain off the health care systems and also have happier and healthier animals in our environment. I think it's testament and it's something we owe these animals." Veterinarian.

A point made among the veterinarians is that the responsibility of zoonotic diseases should lie with colleagues who have a special interest in the area. They suggested a training program could be implemented to acknowledge board qualified specialists in the veterinary field.

The timely recognition of the interconnection between humans, animals, and environment, in the One Health approach, is a key prerequisite for understanding and managing the future of global health threats.

Table 1. Participant information

Profession	Years in practice
1. Veterinarian	< 1 year
2. Medical Doctor	2 years
3. Veterinarian	4 years
4. Medical Doctor	1.5 year
5. Veterinarian	15 years
6. Medical Doctor	<1 year
7. Veterinarian	43 years
8. Veterinarian	< 1 year
9. Medical Doctor	3 years
10. Veterinarian	18 years
11. Medical doctor	30 years
12. Medical doctor	6 years

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The consideration of a transdisciplinary approach to One Health

When asked about how to move forward within the One Health concept all participants agree: a collaboration between the professions is desired, however it was difficult for them to suggest how this could be implemented. A common thought was that collaboration needs to start on a policy or state level rather than clinically. Practical issues could become apparent, such as sharing medical records and the fact that medical doctors are trained in treating, diagnosing and advising humans, as are veterinarians for animals. Furthermore, it could be difficult in clinics due to time constraints and funding.

"That [clinical collaboration in practice. ed] sounds a bit complicated... since the veterinarians are good at treating animals, like, and we are good at treating humans. It would have been better then, to have a collaboration and educate doctors on this topic [zoonoses ed.]" Medical doctor.

A repeated answer was that it can be unclear whom to contact in the case of certain zoonotic diseases. Several participants suggested a source to contact for transdisciplinary approaches to a disease, or to refer their patients to for advice and information.

"It might be good to have an open [phone ed.] line for medical doctors and veterinarians to contact, as we do for infectious diseases, to consult when faced with something like that..." Medical doctor.

It was suggested a transdisciplinary collaboration should start as early as during their undergraduate education, with joint lectures and networking across the specific disciplines. They all agree that this would have been greatly appreciated when they were students and should be encouraged.

"I think building bonds with medical doctors, even having a mentoring or buddying system through university where we could maybe be matched up with a human doctor, veterinary student, even a pharmacist and other medical professionals" Veterinarian.

Patient history taking

Participants were asked whether they obtain information about other individuals in the household, including animals. All veterinarians reported that they have asked about the health of (human) family members when faced with a potentially zoonotic disease. Some report that this is part of standard medical history taking.

"And sometimes a little bit of information about the family, whether there is someone who is maybe immunocompromised in the household, or small children that can be more susceptible to some parasitic diseases we can commonly see come from dogs". Veterinarian.

Questions pertaining to animals in the household was not a common occurrence among the doctors. It was simply not something they thought about from an infectious disease point of view. All doctors said that maybe they should ask about animal contact, however a couple mentioned they do not feel as if they have the need to include it in their history taking. When asked why, answers differed, ranging from that they did not know and had never thought about it, and not trained to include animals.

"It is not as if I think when a patient with diarrhoea comes in "Ah, this might be a zoonotic disease" but more that I try to find the causative agent [...] However, remembering to ask what animals they have or what animals they come into contact with, is probably worth considering" Medical doctor.

Overall, this study found that among the participants, the veterinarians appear more concerned of the zoonotic disease potential in their patients, whereas the medical doctors report that they may not think of the fact that the disease is zoonotic, rather they focused on the patient presented in front of them.

Zoonotic disease perception

There were some discrepancies in the exact definition among both professional groups, but all participants could mention that there are diseases that can spread from animals to humans.

All veterinarians spoke about rabies, which was not commonly mentioned among the medical doctors. When asked why they thought zoonotic diseases were important and why a disease was more important than others, the severity and outcome of a contracting that disease was mentioned by almost all. Both professions reported life threatening (to humans) diseases as most important, such as rabies and pandemic influenza strains, but almost all medical doctors also mentioned tick-borne diseases as very important due to their common occurrence in the region where they work. This type of disease was not mentioned as important among the veterinarians.

Professional roles in educating the public

Overall, the consensus of the participants is that veterinarians and

Table 2. Example of the process of thematic analysis

Transcript	Code	Category	Sub- category
"There has to be collaboration...the responsibility cannot be the veterinarians' alone, it has to be shared between veterinarians, doctors and the public health agency".	Who should educate public?	A shared responsibility	Roles

Table 3. Categories and sub-categories

Categories	Sub- categories
One Health perceptions and knowledge	The need for more training among medical doctors
The consideration of a transdisciplinary approach to One Health	Platforms for clinical collaboration Professional mentoring / networking across disciplines
	Ability to refer to veterinarians as a medical doctor
Patient history taking	Considering zoonotic disease, a potential differential diagnosis
Zoonotic disease perception	Important zoonoses
A shared responsibility	Roles in educating the public

medical doctors have a joint responsibility in educating the public about the risk of zoonotic diseases, and that no profession should have to bear the responsibility alone.

"There has to be collaboration…the responsibility cannot be the veterinarians' alone, it has to be shared between veterinarians, doctors and the public health agency". Veterinarian.

However, some answers indicate that it would be more natural for the veterinarians to take the lead in educating the public. And one important aspect of responsibility was brought up: the responsibility of the pet owners themselves, that the public cannot rely on the professions to deliver education to them.

"I think we have a joint role actually... I do not think that we can put all the responsibility on one profession or category…and when you get a pet I think that as a pet owner, one self has the responsibility to find out "what does this mean for me" […] what possible diseases can I get.. that's number one really... that the individual who gets a pet has to find these things out […]. Medical doctor.

DISCUSSION

An important finding was that medical doctors interviewed in this study were unaware of the One Health concept, and that most of them do not ask questions about animal contact in their medical history. The medical doctors in this study were open about their opinions regarding their medical training with respect to this discipline, or lack thereof. Most mentioned they felt that they did not receive enough education in zoonotic disease transmission, related patient history taking and the apparent relative frequencies of these diseases, and thus not including that in their diagnostic work up of patients. Most said that they think more lectures on the subject during their training would be helpful.

The results of this study could carefully be compared to previously conducted quantitative studies, where more pet owners reported that veterinarians had discussed zoonotic diseases and asked about animal contact compared to their medical doctors (17).

All veterinarians in this study were aware of what One Health was and could expand on its concept on different levels, most likely due to their training and the space One Health and zoonotic diseases appear to take in veterinary curriculum. Furthermore, veterinarians encounter the risk of zoonotic diseases daily, so it would be surprising if they were unaware of them. To achieve a collaborative approach to One Health or public health, it is important that the participants know that there is an existing concept and how to access it as a resource. If medical doctors are unaware of this concept, the goal of working together to limit disease transmission between animals and humans would be impossible to reach. It should be noted that all participants in this study were open and encouraging of a transdisciplinary approach and collaboration toward healthier animals and people, thus showing willingness to work together to improve public health.

It is therefore desirable to further expand on this field of expertise among the medical professionals to ensure a greater possibility to diagnose zoonotic diseases and to limit further transmission. Perhaps through transdisciplinary courses and lectures during university, continuing education via webinars and seminars we could improve collaboration and thus One Health.

Many participants suggested a collaboration higher up in the diagnostic chain, such as recognised specialists in public health working together, or making a phone line accessible for both veterinarians and medical doctors to call for further professional advice. Not all participants knew where to turn or had ever thought of contacting someone of the opposite profession for guidance. This calls for

Outbreaks of different virus infections are particularly severe examples of how close interactions between the health of humans, animals, and the environment can lead to a deadly epidemics.

The One Health approach is an example of how separate efforts can be aligned to work together effectively.

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clearer policy instructions in the primary care facilities, emergency department of hospitals as well as in veterinary practices in Stockholm, Sweden, to ensure that medical staff know where to turn for further support in the face of zoonoses.

Methodological strengths and limitations

Being a qualitative study, the results are based on the individuals' perceptions and their willingness to elaborate on their experiences. It relies on the participants answering the questions to the best of their ability, but true memory recall, willingness to respond and honesty cannot be completely guaranteed. This study also involves a small cohort and could be of more weight if there was a larger number of interviews.

Conclusion

Based on the findings in this study it would be recommended to consider joint training across the fields of medical sciences and open up a platform for collaboration between the disciplines. Comparing these findings with other countries curriculums in medical training could be helpful. If joint lectures were applied at university level, we could graduate medical doctors and veterinarians with more knowledge about zoonotic disease transmission and the One Health concept. But more research is recommended to further investigate the curriculum of medical and veterinary sciences, and the perceptions of One Health among the doctors and veterinarians around the world.

ETHICS STATEMENT

All participants were invited on a voluntary basis. Each person gave their informed consent and their participation was kept confidential. Throughout the study and interviews, guidelines and principles as per World Medical Association's Declaration of Helsinki were followed (25).

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