

One Health: An Introduction and Initial Assessment

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INTRODUCTION

Rudolf Virchow once said, “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.” It was Dr. William Osler who coined the term “one medicine” to discuss the importance of physicians understanding the commonalities between humans and animals. In 1960, epidemiologist Calvin Schwabe really solidified the concept to encourage a shared base of knowledge between medical and veterinary doctors (6). As ideas continued to evolve, the concept of One Health emerged, which, in addition to promoting collaboration between medical and veterinary doctors, also promotes an understanding of environmental and ecological changes as necessary to promote wellness for all species (4,5). The importance of this concept cannot be understated as our climate changes and the long-term effects of these changes are difficult to predict. For instance, it has been estimated that of the emerging and re-emerging infectious disease seen in the last century, more than 75% are zoonotic in origin, and it is believed that the increase in incidence of these diseases is accelerating (1,3,4). Evidence exists that many of these zoonotic diseases are affected by ecological and climate change. For instance, it has been established that a loss of biodiversity is associated with increased risk of transmission of a variety of zoonotic diseases in many geographical areas of the world, including the United States where loss of avian diversity increases the risk of West Nile transmission, and loss of mammalian diversity increases the risk of Lyme disease (3,7). This pilot study was designed to assess physician aptitude in dealing with zoonotic diseases, physician habit in discussing environmental safety measures and hazards with their patients, and to assess physician perceptions on threats to human health. It highlighted the importance of collaboration with professions such as Veterinary Medicine, Disease Ecology and Conservation Biology, and introduced the concept of One Health. It is important to remember that One Health encompasses more than just disease (including many positive outcomes when using a One Health approach) and this study was specific as it was a pilot study in addition to an introduction to One Health.

METHODS

Survey design was completed by this author using Psychological Testing by Kaplan and Saccuzzo as a framework for Likert scale survey testing. The cases were designed by this author using the CDC’s website for complete symptoms. The survey went through five drafts before its final form. It was edited by Dr.’s Milta Little DO, Miguel Paniagua MD, Stuart Slavin MD and Sharon Deem DVM. The final draft was entered into the Qualtrics Survey Software provided by Saint Louis University. Survey options were selected that allowed anonymization of respondents. The IRB protocol was written by this author and the survey received IRB exempt approval. One edit was made to the survey after the study had started and this was IRB approved.

Email addresses for survey distribution were obtained through the institution’s People Finder and at one outside hospital through the Department of Internal Medicine’s administrator. The following departments were selected for the study: Emergency Medicine, Internal Medicine, Internal Medicine/Infectious Disease, Combined Internal Medicine/Pediatrics, Pediatrics, and Family Medicine. Only residents and fellows were selected to participate in the study. 148 individuals received an invitation to participate in the survey. The survey was distributed via email in August 2014. Respondents received biweekly and then weekly reminders to complete the survey until December 2014. For a full copy of the survey please contact the author.

RESULTS

Of 148 respondents invited to participate, only 24 individuals finished the survey. Another 2 individuals opened the survey but ultimately answered no questions. Of the 24 individuals who finished the survey, not all of them answered every question in the survey.

Not all results are shown and discussed. Gender break down, institutional affiliation and resident training year are not shown.

22 respondents were in the 25-35 age demographic. 8 Pediatrics residents, 9 Internal Medicine residents, 1 Infectious Disease fellow, 3 Emergency Medicine residents, 3 combined Internal Medicine/Pediatrics residents and 1 Pulmonary and Critical Care fellow responded.

15 individuals responded to the free text question “Please list, in your opinion and in order of importance, 4 major global threats to human health.” Their responses may be viewed in Table 1. Responses to Likert scale questions may be viewed in Tables 2-6 & Figure 1 along with their questions.

Not all 24 respondents responded completely to the two case questions. The results may be viewed in Figures 1 and Table 7. Case one described a young woman suffering from an encephalopathy and asked what the pathogen and vector would be in order of likelihood. Case two described a man suffering from respiratory failure with an image of a skin ulcer and asked what appropriate follow up question would most likely help in determining the etiology of his disease.

Table 8 shows the results of question 12 which was written to ascertain if residents were up to date on emerging infections in their state of practice.

Table 1. Nine individuals mentioned issues pertaining to disease prevalence and management. Three individuals mentioned climate change or change in environmental resources. Four individuals mentioned lack of access to clean drinking water, an issues that may also be amenable to a One Health approach.

Genetically modified food, antibiotic resistance, lack of health access. emerging infectious diseases	Availability of basic medical care, vaccinations, nutrition, and basic education availability	Communicable diseases, poor hygiene, war, environmental changes	Infections, cancer, heart disease, diet
Road accidents , TB , malaria , war	War, smoking, poor access to medicine, lack of sanitization	Cost, lack of efficient delivery system of medication, lack of proper medication, poor nutrition	Unsanitary water, air travel
Unclean water, disease (HIV, other deadly viruses), food scarcity, climate change/global warming	Political unrest, quarantine policies in countries, lack of facilities/economy, lack of a general interest	Obesity, malnutrition, infection- vaccine preventable disease	Bioterrorism, ozone layer concerns, environmental resources-loss of those resources
Decreased immunization rates, global travel, malaria, no access to safe drinking water	Poor/inadequate nutrition, poor access to clean drinking water, violence	Government regulatory bodies, economic classism, rapid transnational travel, fascist religious movements	

Table 2. Q6: I ask patients if they have pets at home. (0=never, 1= rarely, 2 = sometimes, 3 = often, 4 = always)

Answer	Response	%
0	1	4%
1	6	25%
2	5	21%
3	7	29%
4	5	21%
Total	24	100%

Table 3. Q7: I discuss safety measures with my patients in regard to animal exposures such as dealing with animal bites. (0=never, 1= rarely, 2 = sometimes, 3 = often, 4 = always)




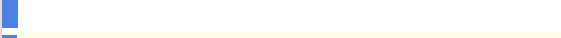

Answer		Response	%
0		7	29%
1		7	29%
2		8	33%
3		1	4%
4		1	4%
Total		24	100%

Table 4. Q8: I discuss safety measures with my patients in regards to vector exposures, such as wearing bug spray while outdoors. (0=never, 1= rarely, 2 = sometimes, 3 = often, 4 = always)





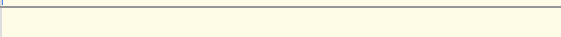
Answer		Response	%
0		3	13%
1		9	38%
2		9	38%
3		3	13%
4		0	0%
Total		24	100%

Table 5. Q9: If my patient has pets, I will ask them if their pets have all their immunizations (e.g. rabies, distemper). (0=never, 1= rarely, 2 = sometimes, 3 = often, 4 = always)


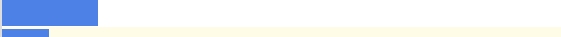
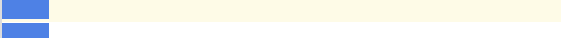

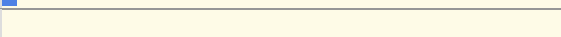




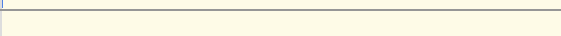
Answer		Response	%
0		11	46%
1		6	25%
2		3	13%
3		3	13%
4		1	4%
Total		24	100%

Table 6. Q10: If my patient has pets, I ask if their pets have been dewormed. (0=never, 1= rarely, 2 = sometimes, 3 = often, 4 = always)

Answer		Response	%
0		20	83%
1		3	13%
2		1	4%
3		0	0%
4		0	0%
Total		24	100%

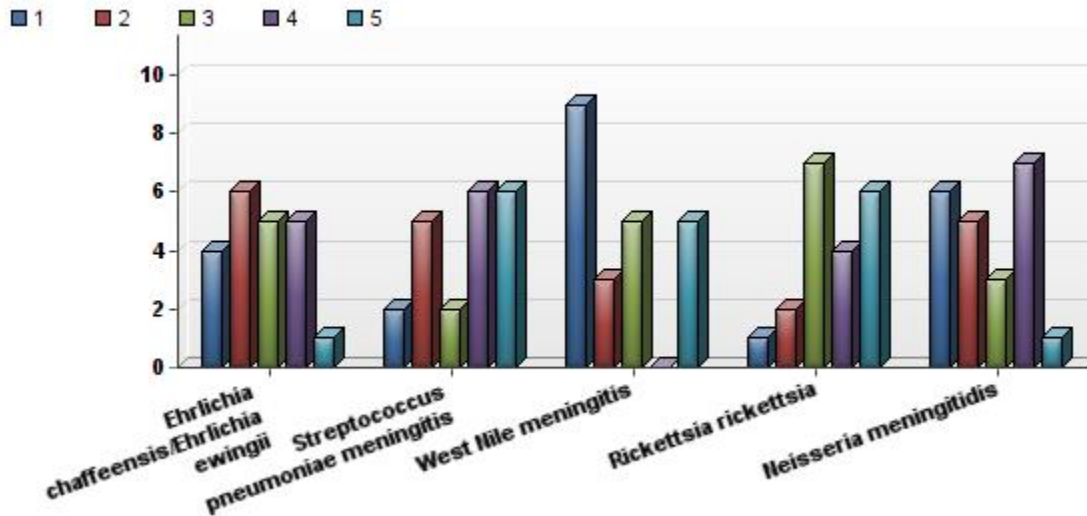


Figure 1. Six individuals ranked Ehrlichia as second most likely on their differential (red). Seven individuals ranked Rickettsia as third most likely (green). A large number of respondents (nine) ranked West Nile as the most likely (dark blue). Six individuals ranked Neisseria as the most likely. Only two individuals ranked Streptococcus as the most likely culprit on their differential. Of the tick-borne illnesses, four individuals ranked Ehrlichia as most likely and only one ranked Rickettsia as the most likely. Symptoms for the case were retrieved from the CDC’s website for the presentation of Rickettsia rickettsia. For the follow up question regarding the vector responsible for the illness in this case, eight individuals believed a mosquito was most likely responsible, six believed a tick was most likely responsible (data not shown).

Table 7. Over 50% of the respondents correctly asked if the patient had been hunting in the last 2 weeks. The case was designed using the CDC’s website for presentation and risk factors for pneumonic tularemia.

Answer	Response	%
Do you have ill pets at home?	0	0%
Has he had recent contact with domesticated livestock?	3	14%
Has he been hunting in the last 2 weeks?	11	52%
Has he been fishing in the last 2 weeks?	2	10%
Do you have birds at home?	5	24%
Total	21	100%

Table 8 In 2012, a Missouri physician identified a novel vector-borne illness. What was this pathogen and its vector? 8 respondents correctly answered that the new vector-borne illness was named the Heartland Virus and was carried by ticks. 9 believed it was carried by mosquitos but knew the correct name of the pathogen.

Answer	Response	%
Heartland Virus/Ticks	8	36%
Heartland Virus/Mosquitoes	9	41%
Missouri Fever/Ticks	2	9%
Missouri Fever/Mosquitoes	3	14%
Total	22	100%

When asked about the challenges of interdisciplinary approaches to health problems, very few individuals responded. Those that did cited a lack of international cooperation, applicability across cultures and climates, difficulties with organizing and coordinating effort and the government as perceived difficulties. 19 respondents indicated they were not familiar with the concept of One Health before this survey and 3 indicated they were. 12 individuals indicated they would be willing to participate in One Health conferences, though how many times per year varied. 4 were unsure if they would participate and 5 said they would not. At the conclusion of the survey 16 individuals were interested in learning more about One Health.

DISCUSSION

Unfortunately, given the response rate, very little can be concluded, or generalized, from the survey results regarding physician aptitude assessing for zoonotic diseases, habits and willingness to collaborate inter-professionally. Future surveys may be shorter and separate the Likert questions into one survey with a follow up survey having more in-depth cases to improve the number of respondents. However, the results that were acquired provide an interesting framework for One Health discussion. We live in a world that is rapidly changing. Human health impacts of these changes have been difficult to study and quantify. Evidence has shown, as well, that many of the negative changes will most severely impact the poor and disenfranchised though it would be naïve to think that escaping effects is possible for any country (1, 6, 7). Many of these negative effects are related to zoonotic diseases especially as many are changing their geographic distribution in response to climate change (e.g. Dengue and Chikungunya moving higher north in latitude). Many effects, however, will be more difficult for physicians to assess and respond to. For instance, anxiety and depression rates have been shown to increase in individuals living in ecologically degraded environments (1,3). In addition, the burden of climate refugees, including the burden on the recipient countries and the burden of civil strife secondary to migrations, are difficult to predict (3). In order for countries to respond appropriately and humanely to the issues that arise, they need to understand the complex interactions between humans, animals and their environments. It will be vital for physicians to collaborate with their colleagues in veterinary medicine, disease ecology, conservation biology and public health to get ahead of new and re-emerging zoonotic diseases and to improve human health by improving their environments. A One Health approach will also promote social justice, as we cannot allow the burden of ecological degradation and climate change to be carried only by the poor and marginalized. As physicians, we are well placed to collaborate with colleagues across a variety of disciplines and to advocate a One Health approach to our trainees, our medical colleagues, and to help our patients use the concepts of One Health to improve their lives on their own as well (e.g. through gardening, pet therapy, outdoor exercise, sustainable living and nutrition). I encourage everyone to visit the One Health Commission and Initiative's websites to learn more about One Health and how to incorporate One Health concepts into their practice of medicine.

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