Journal of Public Health | Vol. 38, No. 4, pp. e592–e595 | doi:10.1093/pubmed/fdv165 | Advance Access Publication October 29, 2015

Chekhov's Corner

Ebola as a course: uniting basic sciences, public health and the humanities

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ABSTRACT

The most recent epidemic of Ebola virus disease (EVD), beginning in Guinea in December 2013 and still underway as of September 2015, has claimed almost 11 300 lives and resulted in almost 28 000 cases. The first EVD epidemic in history to span multiple countries at once; the outbreak caught the world unprepared, undoubtedly leading to higher illness and death counts that may have occurred in areas with solid medical infrastructure. An analysis of the many facets of the epidemic touches on many important topics covered in an introductory global health course, including issues of economics, ethics, culture, infectious disease, policy, preparedness and technology. However, in contrast to many global health offerings, a study of Ebola provides a unifying narrative throughout the course.

Keywords Ebola, emerging diseases, global health, outbreak, zoonotic diseases

Introduction

Ebola virus disease (EVD) re-emerged in 2014 in a spectacular fashion, gaining attention around the world as the largest outbreak of the virus in history exploded primarily in the West African countries of Guinea, Sierra Leone and Liberia. While, at the time of this writing, the outbreak continues in Sierra Leone and Guinea, Liberia was declared Ebola free on 3 September 2015. To date, almost 28 000 cases and 11 300 deaths have resulted from this outbreak[1]—approximately 10 times the total cases and fatalities from all previous EVD epidemics combined.

Despite the many missteps that characterized this outbreak, there are many teachable moments. Perhaps most critically, it has demonstrated the importance of thinking beyond academic silos and disciplines when considering infectious disease epidemiology and global health. Various aspects of the outbreak can be combined into a structured course offering, linking the different aspects of the Ebola crisis into a coherent pedagogical narrative, including aspects of virology, epidemiology, anthropology, history, communication, ethics and policy (Table 1).

A number of these topics could be—and are—a course unto themselves. Many, such as the history of colonialism and the subsequent development of the affected countries, or an overview of medical anthropology, would necessarily require a brief and somewhat superficial treatment, but even a short discussion of these topics would provide an introduction to an area that many students—even public health students—do not realize exists.

History, colonialism and the current state of affected countries

It is difficult to understand how the EVD outbreak developed in the manner that it did without having some understanding of the history of the affected countries. Whether discussing past epidemics of Ebola in the Democratic Republic of Congo, Uganda or the West African countries primarily affected in 2014, each has a history of influence from white Europeans. The lingering impact of these relationships have, in part, set the stage for the reactions we saw in 2014 to both the outbreak and the subsequent international response, with

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Table 1 Ebola: an interdisciplinary global health narrative

Basic science	*Applied and clinical practice*	*Culture and norms*
Epidemiology	Treatment	History
Virology	Vaccination	Anthropology
Pathology	Clinical trials	Risk communication
Ecology	Policy	Ethics

much suspicion and mistrust on the part of West Africans to American and European aid.

The current state of the affected countries must also be taken into account. EVD outbreaks have typically taken place in the most impoverished countries in the world. Countries lacking adequate healthcare systems are susceptible to outbreaks of any infection, and Liberia (no. 4), Guinea (no. 13) and Sierra Leone (no. 24) are some of the world's poorest countries.[2] As such, Ebola simply was the match that lit existing kindling—erupting in an area with porous borders, poor healthcare infrastructure, crippling poverty and mistrust of the biomedical model of disease.

Anthropology

Going hand in hand with the history of the affected countries is an understanding of their culture and beliefs, particularly as those beliefs pertain to illness and health.[3] An overview of medical anthropology helps students to understand why, for instance, it is not simply accepted by many in affected countries that this unseen viral entity called Ebola exists and is transmissible between people, and that it is the cause of illness and death in the outbreak.[4] When students learn that there are a variety of medical belief systems present in the affected countries, and that these pre-existing systems influence how individuals living there process an outbreak such as EVD, it becomes much easier to understand resistance to changes in burial practices, or to use hospital facilities—particularly when coupled with a knowledge of the area's history and racial tensions.

A basic understanding of anthropology also can open up discussions into why the interest in the Ebola outbreak did not spike until the first Americans were diagnosed with the disease and brought back to the USA for treatment (Fig. 1). The concept of 'othering', viewing individuals as different and apart from another group, often in a way that dehumanizes them, is a useful idea to understand that many global health problems are unaddressed or 'neglected', including Ebola.[5] An introduction to anthropology allows students to understand that Ebola outbreaks are a confluence of history, poverty and ecology.

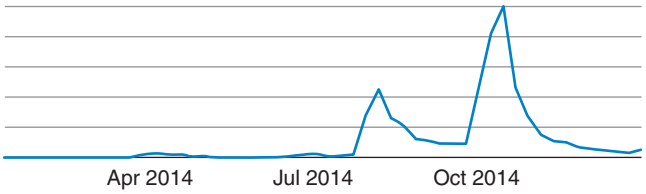

Fig. 1 Ebola search trends in the USA, 2014. Ebola searches in the USA throughout 2014. Searches spike in August, when Ebola-infected Americans Kent Brantly and Nancy Writebol are repatriated, and in mid-October, after Thomas Eric Duncan dies of Ebola in Texas, and nurses Amber Vinson and Nina Pham contract the disease. Data Source: Google Trends (www.google.com/trends).

Virology and epidemiology

Once the stage is set regarding the geography, history and culture of the area affected by EVD, a deeper understanding of the virus itself can be pursued. Questions raised during this epidemic include many that require an understanding of the basic virology and epidemiology of the Ebola virus. This may include discussion of the pathology caused by the virus—which can work to dispel the perception that every Ebola infection leads to a dramatic, bloody death (myths perpetuated by popular culture; see below). Students can also learn about the differences between Ebola virus species, both in geographic distribution of outbreaks to date and in mortality rates (e.g. Reston virus versus Ebola virus); animal models of disease, including primates[6] and pigs;[7] as well as lingering post-EVD complications.[8]

A study of the epidemiology can also include a review of past EVD outbreaks in central Africa,[9] including interventions that were used to stem spread of the virus (changes in burial practices, isolation of patients, personal protective equipment [PPE] use by healthcare workers);[10] a discussion of the potential for mild or asymptomatic infections that could complicate surveillance efforts;[11] the search for potential reservoir species;[12] the potential of butchering or consumption of wild game to spark outbreaks,[13] just to name a few.

Treatment and vaccination

The West African EVD epidemic brought to the forefront the extreme limitations we have to prevent and treat this disease. Vaccines and treatments for EVD[14] have not been a priority, due to the low number of cases of disease prior to 2014 and the sporadic nature of outbreaks, taking place exclusively in impoverished, developing countries. A discussion of these issues can lead not only to an understanding of the economics of drug and vaccine development, but also the workings of clinical trials and the ethics of conducting such

research in developing countries with a history of exploitation in the midst of an explosive epidemic.[15]

US cases and media reaction: the need for effective communication

When EVD was imported into the USA, first in returning missionaries Nancy Writebol and Kent Brantly and later with the arrival of Thomas Eric Duncan, it provided a stark example of the differences in resources and healthcare systems available in the USA versus the affected West African countries. However, rather than focus on the gulf in resource availability between the locations, and the exceedingly low potential for Ebola transmission in the USA, there was in its place a narrative emphasizing Ebola's dangers, including the (oversold) possibility of 'airborne Ebola'.[16]

As secondary cases in Texas were diagnosed following Duncan's death, individuals were put into quarantine or 'voluntary' isolation for days or weeks. When New York physician Craig Spencer was diagnosed in late October, the Governors of New Jersey and New York instituted a mandatory quarantine for anyone returning from work with patients in West Africa.[17] Polls showed that individuals were highly overestimating their risk of acquiring EVD in the USA,[18] and that individuals who had traveled to countries in Africa far distal from the EVD outbreak were still subjected to harassment, quarantine and even job loss because of the idea that Africa equals Ebola. Many such examples are collected at journalist Maryn McKenna's tumblr, 'The Further Adventures of Germ Girl', under the tag 'Today in #Ebolanoia'.[19]

As such, this portion of the course can serve as an introduction to risk communication in public health—how does one communicate the appropriate level of concern for a health risk, without suggesting over-confidence or alternatively, hyping the risk? This is particularly difficult given the background many Americans may have regarding EVD, which often included consumption of media such as *The Hot Zone* or the movie *Outbreak*, about a fictionalized EVD-like epidemic in California. It can also serve as a jumping-off point for discussion regarding the appropriateness of public health response—for example, was quarantine necessary? Helpful? Appropriate? Legal? Ethical?

Conclusion

While a course focused on Ebola as proposed would necessarily take away time from global health issues with a higher case count, the format of a global health course centered on a single disease allows for students to approach the various angles with one cohesive theme. Extrapolations to other global health issues can also be explored, including compare/contrast exercises or student-led projects. The controversial nature of many of the topics can lead to an enriching student discussion, and the ongoing nature of the outbreak (as of the time of writing) and the risk of future outbreaks make this a universally timely course set-up.

While Ebola is not alone among infectious diseases in necessitating an integrative approach to truly understand and respond to the outbreak, it is certainly unique in the amount of attention and research in a wide swath of disciplines that it has received since the beginning of the outbreak in 2014. It also has a well-documented history, with its first confirmed introduction into the human population only 40 years ago, followed by a relatively small number of outbreaks in the ensuing decades. As such, a study of Ebola is by its nature more reduced in scope than that of other major global infections, such as tuberculosis, HIV or measles. It allows for a focused view into the response to a single organism; a microcosm of the larger problems present in global health, where the student can examine how gaps in our understanding at each 'silo' level led to the 2014–15 outbreak—and more importantly, how to work together to fill such gaps in the future.

Further, while the topics above are merely a sketch, they are very customizable as well to include other aspects of the EVD outbreak. Those interested in mental health could add additional modules describing how surviving EVD affected both former patients as well as caregivers, and the stigma associated with being in either class.[20] Those with more interest in policy could include additional sections focused on WHO response, missteps and promised changes.[21] Other topics could include Ebola orphans; conspiracy theories about the outbreak in the USA and globally; the economic impact of the outbreak on the affected countries; the lack of routine care for other patients during the outbreak, including pregnant women and the setting aside of routine vaccinations, which has increased the risk of a measles outbreak,[22] just to name a few. As such, a course examining all aspects of the EVD outbreak provides a centralizing lens through which to understand many larger problems in global health and infectious disease epidemiology.

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