

Environmental Health—Champions of One Health

Christopher Eddy, MPH, REHS, RS
Boonshoft School of Medicine
Wright State University

Paul A. Stull, DVM
Montgomery County Office of
Emergency Management
University of Dayton

Erik Balster, MPH, REHS, RS
Preble County General Health District

Abstract The authors find overwhelming evidence among environmental health practitioners that One Health disease reporting concepts are essential to the early detection of, and expedient recovery from, pandemic disease events. The authors also find, however, extraordinary evidence that local public health is not prepared, and potentially unaware of their responsibility, to be the initiator of the zoonotic infectious disease information intelligence necessary to make such early event mitigation possible. The authors propose that NEHA take an affirmative step towards the development of local public health–initiated biosurveillance systems by organizing and leading a tabletop study group that includes the Centers for Disease Control and Prevention, American Veterinary Medical Association, American Medical Association, Food and Drug Administration, U.S. Department of Agriculture, Institute of Medicine, and a robust panel of NEHA state affiliates. This study group should discuss the infrastructure necessary for local public health—the frontline against community-acquired infectious disease—to be the initiators of environmental health, veterinary, and medical One Health biosurveillance systems. The need to establish a community-focused, integrated disease prevention strategy that cautions people about the risks associated with food, water, animal, and contaminated environmental media, both prior to and during epidemic and pandemic events is equally important.

Introduction

“One Health,” as defined by the American Veterinary Medical Association (AVMA), is “one strategy to better understand and address the contemporary health issues created by the convergence of human, animal, and environmental domains (AVMA, 2008).” Since 2008, One Health has been endorsed by the environmental health and medical cornerstone professional health organizations: the American Medical Association (AMA) and NEHA. One Health as a general concept is best described by the need to integrate environmental health,

veterinary, and medical disciplines to accomplish the meaningful prevention of zoonotic disease (specifically epidemic and pandemic events), through a coordinated stream of disease surveillance intelligence exchange systems (Eddy, Sase, & Schuster, 2010).

Biosurveillance as initially described by Homeland Security Presidential Directive 21 and modernized by the Centers for Disease Control and Prevention (CDC), the Department of Homeland Security (DHS), and the Institute of Medicine (IOM), however, is dependent upon “local up” (mean-

ing that local public health is the source of zoonotic disease intelligence, not the “top down” recipient) surveillance intelligence networks (Bush, 2007; DHS, 2012). We find overwhelming evidence among environmental health practitioners that One Health disease reporting concepts are essential to the early detection of, and expedient recovery from, pandemic disease events. We also find that local public health is not prepared, and potentially unaware of their responsibility, to be the initiator of the zoonotic infectious disease information intelligence necessary to make such early event mitigation possible. We propose that NEHA take an affirmative step towards the development of local public health–initiated biosurveillance systems by organizing and leading a tabletop study group that includes CDC, AVMA, AMA, the Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), the Institute of Medicine (IOM), and a robust panel of NEHA state affiliates. This study group should discuss the infrastructure necessary for local public health—the frontline against community-acquired infectious disease—to be the initiators of environmental health, veterinary, and medical One Health biosurveillance infectious disease systems. The development of a sophisticated and integrated residential, community health public information system that cautions people about the risks associated with food, water, animal, and contaminated environmental media is equally important.

Biosurveillance

Pandemic influenza H1N1 2009 has proven that little direct evidence exists of environmental health, veterinary, and medical information exchange systems in place or

TABLE 1

Responses of NEHA and Association of Ohio Health Commissioners (AOHC) Survey Participants

Question	Response	
	Agreement	
	NEHA # (%)	AOHC # (%)
1.) Will pandemic events likely be zoonotic in origin?	44 (91)	46 (98)
2.) Will hospital-acquired infection increase proportionate to surge capacity expansion and exceedance?	44 (91)	37 (79)
3.) Do you think that companion animals can adversely affect the health of an immunocompromised patient?	37 (77)	44 (94)
4.) Do you participate in a syndromic zoonotic disease reporting system presently (other than rabies and mosquito-borne disease)?	19 (39)	10 (21)
5.) Is it important to establish sentinel, syndromic zoonotic disease reporting systems?	48 (100)	45 (95)
6.) Do you think that local veterinary/medical/public health cooperatives can help predict and prepare for disasters?	45 (94)	39 (83)
7.) Do you think public health has been involved directly in One Health?	16 (33)	5 (11)
8.1) Should NEHA* pursue a lead role in zoonotic disease reporting?	40 (83)	N/A
8.2) Should AOHC* pursue a lead role in zoonotic disease reporting?	N/A	40 (86)

*NEHA response based on 48 respondents. AOHC response based on 47 respondents.

functional in the U.S. nor in the rest of the industrialized world (Eddy et al., 2010). Given that 75% of all emerging infectious diseases are zoonotic, it is likely that diseases like avian influenza and future novel pathogens will continue to evade early detection systems and the vaccination preparation processes currently in place (Centers for Disease Control and Prevention, 2013). According to the National Biosurveillance Integration Center, biosurveillance is

“the science and practice of managing human, animal, plant, food, and environmental health related data and information for early warning of threats and hazards, early detection of events, and rapid characterization of the event so that effective actions can be taken to mitigate adverse health, social, and economic effects (DHS, 2012).”

In the 2012 IOM report, “Applications to Integrated Biosurveillance Workshop Summary,” it is recommended that biosurveillance efforts are initiated at the local level (Institute of Medicine [IOM], 2012). Recent documentation by the National Biosurveillance Integration Center highlights federally based programs contrary to the IOM’s vision of biosurveillance (DHS, 2012).

The 2011 World Health Organization (WHO) critique of the first-ever implementation of the 2005 International Health Regulation (IHR) found that the world is not only poorly prepared for events like the 2009 H1N1 global pandemic, but is especially lacking in capacity for other novel pathogen-originated pandemics (World Health Organization [WHO], 2011). The solution to this inadequacy, according to the IHR Review Committee, is “collaboration between public health and animal-health sectors (WHO, 2011).” The October 2011 Bio-Response Report Card states that “current biosurveillance approaches do not adequately involve or integrate data from entities outside of public health (i.e., clinical sector, private sector, animal, food, water, etc.), slowing governments’ ability to detect and respond to large-scale, multisector outbreaks, such as foodborne illness (Bipartisan Weapons of Mass Destruction Research Center, 2011).” The CDC report, “Food Safety Epidemiology Capacity in the United States, 2010,” finds that a survey of all 50 states shows that many states lack core epidemiologic capacity and lack the ability to “support surveillance (Boulton & Rosenberg, 2011).” While it may be the re-

sult of confusion among health professionals regarding their role in One Health and the types of surveillance systems they ought to be involved with, we theorized that the capacity for One Health biosurveillance disease intelligence systems is not adequate at present.

Methods

To test the hypothesis, surveys were conducted of environmental health professionals representative of local public health at the following two state and national educational conferences:

- 1) The 2009 Association of Ohio Health Commissioners (AOHC) Annual Education Conference, September 30, 2009, Columbus, Ohio.
- 2) The 2009 NEHA Annual Educational Conference & Exhibition, June 22, 2009, Atlanta, Georgia.

Both populations were surveyed using TurningPoint, a real-time, anonymous “voting” software platform. Individual “voting cards” were distributed to audience members, but were limited to 50 individuals per session. Those surveyed were not asked to identify themselves nor was any information about their personal identity recorded.

Data

A high level of agreement existed that the next pandemic event will be zoonotic in nature (both groups averaged 94%); that it is important to establish biosurveillance systems (both groups averaged 97%); and that the biosurveillance reporting systems can signal the beginning of an infectious disease event early enough to minimize its impact (both groups averaged 88%) (Table 1). Seventy percent (average) of both groups surveyed reported, however, that they do not presently participate in a biosurveillance disease reporting system. Surveyed local public health officials agreed (both groups averaged 85%) that maximum hospital surge capacity will increase cases of hospital-acquired infection. Surveyed local public health officials also agreed (both groups averaged 85.5%) that privately owned companion pets can adversely affect the health of vulnerable populations when pandemic disease events occur in the community.

The results indicate that practitioners believe strongly that coordinated sentinel environmental health, veterinary, and human medical biosurveillance disease reporting systems can signal the beginning of an infectious disease

event early enough to minimize its impact; however, data indicate they are not presently engaged in meaningful biosurveillance systems. In practice, One Health concepts are proven to be largely unimplemented: surveyed public health officials reported (both groups averaged 70%) they do not participate. Likewise, only 22% of those surveyed (both groups averaged) reported that they believe public health has been directly involved in One Health. Both surveyed groups agreed (both groups averaged 84%) that their own professional organizations, NEHA, and AOHC should initiate lead roles in coordinating and implementing such One Health biosurveillance systems.

Discussion and Conclusion

Our data support the IOM biosurveillance tabletop findings that local public health is the foundational component of a real time biosurveillance program: providing early detection data from the “bottom up” to state and federal resources (IOM, 2011). We also find that local environmental health professionals agree strongly that environmental health, veterinary, and medical public health collaboratives must be created to achieve disaster preparedness and early event recovery. A sea change in public health policy must occur at local and state levels first, before any meaningful federal success can be acquired. This yet-to-be-developed system should be in alignment with global

biosurveillance disease early detection systems integrating all nations. These systems would provide the means necessary for early detection, response, and mitigation of novel or re-emerging pathogens (Eddy et al., 2010). The findings from our study also highlight the need for escalating public health education programs directed towards vulnerable populations including pet owners and other animal handlers.

Equally necessary, as Eddy and co-authors also point out, is the development of a sophisticated residential community health public information system that cautions people about the risks associated with food, water, animal, and contaminated environmental media. The pace of intelligence gathering and the public dissemination of disease-specific infection pathways (and associated prevention strategies) may limit the amplification of disease in the community and allow early event recovery. The message must be relayed to the public and further reinforced by media during epidemic and pandemic events through a community-focused, integrated disease prevention strategy.

The Role of NEHA in One Health

We encourage NEHA to lead its constituency towards the integration of state and federal biosurveillance systems. Environmental health professionals are key, due to skill set and locale, to serve as the bedrock of biosurveillance systems. We advocate that

the movement known as One Health should find a leader that will take responsibility for bringing the collective groups together in order to achieve “local up” biosurveillance capacity; NEHA would be an ideal candidate for this position. More specifically, we suggest that NEHA organize and lead a tabletop study group that invites CDC, AVMA, AMA, FDA, USDA, and IOM to join a robust panel of NEHA state affiliates to discuss the infrastructure necessary to implement local-origin biosurveillance systems.

While veterinarians and physicians are both subject-matter experts in their respective fields, they both can reside within the broader realm of environmental health. Serving as a bridge or mediator, NEHA would be able to not only offer expert technical advice regarding environmental sources of zoonotic disease but also foster a worthy image for the public health workforce that has historically been the face of response in pandemic events such as the case of pandemic influenza H1N1 2009. 🐼

Corresponding Author: Christopher Eddy, Director of Placement and Workforce Development, Master of Public Health Program, Center for Global Health Systems, Management, & Policy, Boonshoft School of Medicine, Wright State University, 3123 Research Blvd., Suite 200, Kettering, OH 45420-4006. E-mail: christopher.eddy@wright.edu.

References

- American Veterinary Medical Association. (2008). *One health: A new professional imperative*. Retrieved from https://www.avma.org/KB/Resources/Reports/Documents/onehealth_final.pdf
- Bipartisan Weapons of Mass Destruction Research Center. (2011). *Bio-response report card*. Retrieved from <http://www.wmdcenter.org/wp-content/uploads/2011/10/bio-response-report-card-2011.pdf>
- Boulton, M.L., & Rosenberg, L.D. (2011). Food safety epidemiology capacity in state health departments—United States, 2010. *Morbidity and Mortality Weekly Report*, 60(50), 1701–1704.
- Bush, G.W. (2007). *Homeland security presidential directive 21*. Retrieved from <http://www.fas.org/irp/offdocs/nspd/hspd-21.htm>
- Centers for Disease Control and Prevention. (2013). *National center for emerging and zoonotic infectious diseases*. Retrieved from <http://www.cdc.gov/ncezid/>
- Department of Homeland Security. (2012). *National biosurveillance integration center strategic plan*. Retrieved from <https://www.dhs.gov/sites/default/files/publications/nbic-strategic-plan-public-2012.pdf>
- Eddy, C., Sase, E., & Schuster, R. (2010). Pandemic influenza H1N1 2009: Public health emergency preparedness. *Georgetown Public Policy Review*, 15(1), 65–75.
- Institute of Medicine. (2012). *Information sharing and collaboration: Applications to integrated biosurveillance—workshop summary*. Retrieved from <http://iom.edu/Reports/2011/Information-Sharing-and-Collaboration-Applications-to-Integrated-Biosurveillance.aspx>
- World Health Organization. (2011). *International health regulations: Report of the review committee on the functioning of international health regulations (2005) in relation to pandemic (H1N1) 2009*. Retrieved from http://apps.who.int/gb/ebwha/pdf_files/WHA64/A64_10-en.pdf