Making One Health a Reality—Crossing Bureaucratic Boundaries

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ABSTRACT A One Health approach requires that nontraditional partners with differing mandates collaborate and communicate effectively. Barriers to such redefined relationships range from personality and institutional cultural and value differences to impediments that require changes in agency-specific policies. This article reviews interagency One Health collaborations, nationally and internationally. It presents a series of case studies that describe situations in which barriers were overcome, thus culminating in successful One Health outcomes. The case studies illustrate challenges, tipping points, and externally enabling factors that help institutionalize cross-bureaucratic working relationships. Likewise, the cases demonstrate the added value of taking a One Health approach to solving (or preventing) public health problems.

INTRODUCTION

A One Health approach that achieves optimal outcomes requires that nontraditional partners come to a common table to identify solutions that transcend organization-specific mandates. This collaboration requires individuals to go beyond their accustomed comfort zones and function on teams with partners who very likely come from unfamiliar organizational, disciplinary, and even national cultures. Each participant represents a separate mandate and an individual corporate culture and values, and each potentially communicates in agency-specific or industry-prescribed cultural terms that may be foreign to the rest of the team. A recent review paper reports that such interdisciplinary teams are most likely to succeed when they have a unified task and a shared goal and values, and when personal relationships are developed from a foundation of trust and respect (1).

Often, external or imposed forces can actually increase the likelihood of cross-agency collaboration. For example, a One Health approach is more likely to be successful when human, animal, and environmental health entities face a common imminent threat, such as occurred during the 2003 emergence of highly pathogenic avian influenza (HPAI) H5N1. When federal (or other) funding is sufficient and specific enough—as occurred with surveillance for food-borne diseases—interagency activities are likewise streamlined. Sometimes the successful alliances built during periods of imposed necessity form the foundation for trusting relationships that increase the likelihood that subsequent One Health collaborations or alliances will be more easily assembled. However, cross-agency One Health collaborations that are not well focused or compelled by an external exigency are likely to face hurdles that make trust and communication more difficult, especially when fiscal resources are limited and inequitably distributed among agencies and there is a lack of common cause.

Nonetheless, it is not difficult to identify actual cases of cross-sectoral working alliances that reached across...
bureaucratic boundaries to implement a One Health approach, and thus engendered outcomes of value to all stakeholders.

**CASE STUDY 1: 2003 OUTBREAK OF HPAI H5N1**

**Background**
Beginning in the spring and continuing into the fall of 1997, 18 people in Hong Kong were diagnosed with HPAI H5N1, a newly emerged influenza A virus; 6 of these people died. At the same time, H5N1 was diagnosed in poultry and many of the infected humans were reported to have had contact with sick birds. Although at this early stage transmission appeared to occur from birds to humans rather than from one human to another, the rapid emergence and unusual severity of the disease raised the ominous prospect that the HPAI H5N1 virus could spread globally and cause a pandemic similar to the 1918 “Great Influenza.” Concern was intensified because the origin of the infection and exact mode(s) of transmission were unknown (2).

The outbreak was halted by the slaughter of more than 1.5 million chickens at the end of December 1997, along with a ban on the importation of live poultry from mainland China, the only source of live poultry for Hong Kong (3). However, the virus reemerged in Hong Kong in 2003 and since then has spread globally, leading to more than 610 cases and 360 human deaths (4). The threat of human-to-human transmission provoked intense concern and response within the human health community (5). The 2003 outbreaks forced the culling of at least 400 million domestic poultry worldwide. This widespread culling decreased the availability of protein sources, eliminated the livelihood of small farmers, and had a negative impact on poultry export. Ultimately, H5N1 caused an estimated $20 billion in economic damage (6).

**Multisectoral Response**
Human health and animal health agencies, in-country and globally, were affected by the appearance of HPAI H5N1. Successful response to this pandemic threat demanded international and multiagency response, and fortunately, donor funding was supportive of such collaboration (7). Examples of One Health collaborations established during this crisis included:

- **Coordinated global surveillance.** The Global Early Warning System (GLEWS) is a tripartite undertaking (8). It is an enhanced surveillance and reporting system that builds on existing capabilities of the World Organisation for Animal Health (Office International des Epizooties, or OIE), the United Nations Food and Agriculture Organization (FAO), and the World Health Organization (WHO). Although H5N1 was the tipping point that fostered establishing GLEWS, the system serves a broader, enduring function as it links the international community and stakeholders to assist in prediction, prevention, and control of animal disease threats, including zoonoses. It accomplishes this mission through sharing of information, epidemiological analysis, and joint risk assessment.

- **Coordinated research.** Both the U.S. Centers for Disease Control and Prevention (CDC) and National Institute of Allergy and Infectious Diseases (NIAID) provided research funding that required grantees to form coalitions that included public health and animal health, in order to more closely examine transmission of H5N1 between animals and humans (9). The NIAID established five Centers of Excellence for Influenza Research and Surveillance (CEIRS). It initiated the CEIRS network as a result of recommendations from the NIAID Blue Ribbon Panel on Influenza Research and Surveillance (CEIRS). It initiated the CEIRS network as a result of recommendations from the NIAID Blue Ribbon Panel on Influenza Research and Surveillance (CEIRS).

- **Coordinated response.** The Emergency Center for Transboundary Animal Diseases (ECTAD) was established in 2004 to complement existing FAO systems while strengthening response capabilities for H5N1 and similar emerging pathogens (10). Electronically distributed surveillance maps are promptly shared with human and animal health agencies.

- **New lines of communication.** To enhance effective communication and foster trusted relationships, the CDC has assigned personnel as liaisons to both the OIE and FAO. Although the U.S. Department of Agriculture (USDA) had embedded staff with both international organizations, the CDC assignees represented a new level of partnership with animal health organizations (10).

**Case Study Summary**
This case study example demonstrates that a One Health outcome is more likely when:

- Agencies with different mandates face an obvious and common external threat.
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- International funding is adequate to expand existing systems and form new coordinated alliances.
- Entities are willing to support nontraditional staff secondments.

CASE STUDY 2: COORDINATED SURVEILLANCE TO DETECT AN EMERGING PANDEMIC THREAT

Background
Avian influenza (AI) refers to type A influenza viruses that are naturally found in certain species of waterfowl and shorebirds (11). Wild birds and the virus have become well adapted to each other over time, and infection does not usually cause overt disease in wild birds. AI viruses can be classified as highly pathogenic if they meet certain laboratory-defined criteria and may cause high mortality in domestic birds. Additionally, these viruses could undergo genetic shift and drift and potentially cause human pandemics, with profound and global consequences for human populations. In 2003, a highly pathogenic H5N1 AI virus was found in Asia and Europe (12). This discovery raised concerns regarding the potential impact on wild birds, domestic poultry, and human health—specifically, H5N1’s potential introduction into the United States alarmed government health officials. Numerous potential routes for introduction of the virus into the United States were thought to exist, including illegal movement of infected domestic or wild birds, contaminated products, infected travelers, deliberately as a bioterrorism event, and the migration of infected wild birds (13). It was the last possibility that brought public health, agriculture, and wildlife management agencies together to address this urgent issue of mutual concern.

The highly pathogenic H5N1 AI virus first emerged during 1995-1996, when it infected chickens in China (12). Since that time the virus has continued to circulate in Asian poultry and domestic fowl, resulting in significant mortality in these species. The highly pathogenic H5N1 AI virus likely underwent further genetic shift and drift, allowing infection in additional species of domestic birds, mammals, and humans. It then remanifested in wild birds, resulting in significant mortality of several species in China during April 2005.

Coordinated Response
Although the spread of H5N1 AI in Asia had been primarily associated with domestic birds, the presence of this virus in migratory birds raised the possibility that these species could disperse the virus to geographically remote areas. This was thought to be the case in August 2005, when bar-headed geese and whooper swans died on Erkhel Lake, Mongolia, in an area not known to have domestic poultry nearby (14). Concern increased that migrating species could introduce the virus into previously uninfected regions of the world such as North America.

Therefore, at the request of the U.S. Homeland Security Council’s Policy Coordinating Committee for Pandemic Influenza Preparedness, the USDA and U.S. Department of the Interior (DOI) were asked to develop a coordinated national strategic plan for early detection of HPAI virus introduced into North America by wild birds (15). To initiate this effort, the USDA Animal and Plant Health Inspection Services (APHIS) Wildlife Services and DOI U.S. Geological Survey (USGS) convened an interagency working group in the fall of 2005 consisting of representatives from the USDA, DOI, HHS, the International Association of Fish and Wildlife Agencies (IAFWA), and other agency and university partners involved in monitoring and managing wild bird populations. This group developed the Interagency Strategic Plan for the Early Detection of H5N1 Highly Pathogenic Avian Influenza in Wild Birds (USDA and DOI, 2006), which was signed by the secretaries of the DOI, USDA, and HHS in March 2006. To detect potential introduction of highly pathogenic H5N1 AI virus by migratory birds, the plan adopted a variety of surveillance techniques, including sampling of live-trapped and hunter-harvested birds as well as testing of wild bird mortality events. During the 6-year period of active surveillance, more than 450,000 birds or environmental samples were tested across the nation, representing one of the largest wildlife disease surveillance projects ever undertaken in North America (16).

This surveillance project represents an example of One Health in action, whereby agencies from different sectors worked together to agree upon and implement a course of action to address an urgent national issue. Factors that contributed to the success of this project included the sense of urgency among all partners and a common mission or purpose to address what was perceived at that time as a serious threat to public health, the economy, and natural resources. Furthermore, the directive from the Coordinating Committee for Pandemic Influenza Preparedness provided the authority to proceed with the work as well as the means to obtain the necessary funding. Thus, we conclude that to implement successful One Health projects, it helps to identify a common mission or purpose, a sense of importance or
Another benefit of this AI surveillance was that it allowed diverse agencies to better understand one another’s values, cultures, perspectives, and missions and helped build trust and forge common ground among them. These relationships have continued to bear fruit as many of these agencies are seeking ways to work together to conduct wildlife disease surveillance through the formation of a National Fish and Wildlife Health Network (17).

Case Study Summary
This case example demonstrates that a One Health outcome is more likely when:

- There is a sense of urgency and common purpose.
- There is the delegated authority or mandate to conduct the work.
- An interagency steering committee or working group is formed to oversee the work.

CASE STUDY 3: UNIFIED MESSAGING DURING 2009 PANDEMIC H1N1 RESPONSE

Background
In April 2009, several children with respiratory illness presented to health care providers who submitted nasal swabs for influenza testing. These children turned out to be the first reported cases of a newly emerged H1N1 influenza A virus (18). Unfortunately, the media and even scientific agencies quickly began referring to this emergent virus as “swine flu” (19). To a certain extent this moniker was logical because this virus was a unique combination of influenza virus genes never previously identified in either animals or people. Antigenic and genetic characteristics of this virus indicated that it was most closely related to North American swine-lineage H1N1 and Eurasian lineage swine-origin H1N1 influenza viruses (20). However, the term “swine flu” was confusing to many because at that point in time, there was absolutely no evidence that U.S. pigs, or even North American pigs, were infected with the new influenza virus.

The new virus spread rapidly among humans, and the WHO officially declared a pandemic (21). The U.S. public health response was vigorous and transparent, reflected by timely public reporting of human case counts at state and even county levels (18). Rather unexpectedly, some international pork trading partners elected to use the U.S. human case counts as a surrogate for infection among swine herds (22). Several countries that traditionally received U.S. pork products interpreted the human information as a reason to impose state-specific export bans of U.S. swine and pork products. Needless to say, this resulted in an immediate negative economic impact within the swine production community and for the U.S. economy in general. This situation demonstrates how the relationship between human public health and agricultural economic health can become unexpectedly intertwined.

Neither local or federal animal health agencies nor swine producer organizations require that swine influenza virus (SIV) be a reportable disease (23). Although the virus may cause mild clinical illness in animals, infection does not prevent recovered pigs from going to market (24).

The emergence of pandemic H1N1 (pH1N1) among humans inevitably led to some immediate casting of blame. Public health leaders questioned why the USDA was not aware of which SIVs were circulating, why university-based animal diagnostic labs were hesitant to share influenza viral isolates from pigs, and why swine exhibitions and fairs were being held during a human pandemic. At the same time, the animal health community continued to believe that SIV-infected pigs were not a threat to human health and that active surveillance for the virus in pigs and restrictions on exhibitions and sales would create unnecessary market losses. To further inflame this polarization, on August 25, 2009, the Des Moines Register carried a story that reported “CDC Selling H1N1 Plush Toys” in a CDC-based (albeit not CDC-controlled) gift shop. Unfortunately, the toy depicted the virus in the shape of a pig’s snout (25).

Unified Messaging
The previous interagency collaboration for HPAI H5N1 preparedness (described in Case Study 1) had sown the seeds for a trusting, although tentative, relationship among key governmental leaders in relevant animal and human health communities. To their credit, individuals in the pH1N1 response on both sides built on the previous relationships and communicated honestly, while looking beyond their individual agency perspectives. Public health leaders continued to advocate the importance of sampling and identifying currently circulating SIV. Based on sound science performed by the USDA’s National Veterinary Services Laboratories, they were also able to testify to the safety of humans consuming pork from recovered pigs (26). The USDA organized and led 25 separate 1-hour conference calls with a wide variety of key stakeholders, including multiple state and federal agencies, industry representatives, and interna-
national organizations and ministries. The goal was to garner agreement for a one-page set of speaking points intended to be released when—inevitably—the pH1N1 virus would be identified in a U.S. swine herd. CDC subject matter experts participated in every call.

This campaign was a key factor in ensuring that the first official 2009 pH1N1 report among U.S. swine did not lead to further embargoes or trade restrictions (27). The potential trade implications associated with 2009 pH1N1 in domestic pork could have led to a loss of approximately $456 million (28). Forward thinking and a cross-boundary One Health approach averted that loss.

Case Study Summary

This case example demonstrates that a One Health outcome is more likely when:

- Agencies with different mandates agree upon a common external threat.
- A foundation of trust exists among key individuals in different agencies, built on a willingness to acknowledge the other agencies’ concerns.
- A mutually agreed-upon outcome is science based.

CASE STUDY 4: GOVERNMENTAL MANDATE ENCOURAGES INTERAGENCY COOPERATION—PULSENET AND FOODNET

Background

Between November 1992 and February 1993, an outbreak of Escherichia coli O157:H7 was traced back to thousands of pounds of hamburger patties distributed across the western United States, and had public health officials scrambling to prevent additional cases (29, 30). By the time health organizations issued a recall for contaminated meats, the outbreak resulted in more than 700 cases and 4 deaths and led to nationwide panic over the safety of consumer foods. This large-scale incident served as a catalyst, prompting the National Food Safety Initiative to allocate funds to establish enhanced sentinel surveillance systems for preventing and investigating food-borne illnesses (30). Two prominent surveillance systems were established as a result of this legislation: FoodNet and PulseNet (30, 31).

The Foodborne Diseases Active Surveillance Network (FoodNet) is a collaborative, interagency project of the CDC’s Emerging Infections Program, multiple state health departments, the USDA, and the Food and Drug Administration (FDA) (30). Since its establishment in 1996, FoodNet has been essential in attributing specific food-borne pathogens to particular foods, as well as in estimating the overall incidence and burden of food-borne illnesses in the United States (32). The system provides active, population-based surveillance for nine bacterial and parasitic infections commonly transmitted through foods. Information generated by the system enables epidemiological studies designed to guide public health officials on how best to control the occurrence of food-borne outbreaks.

Similarly, the National Molecular Subtyping Network for Foodborne Disease Surveillance (PulseNet) is a national system made up of state and local public health laboratories, as well as federal laboratories, all tasked with conducting molecular subtyping of bacterial pathogens associated with food-borne outbreaks (31). This system allows laboratories in all 50 states to compare culture samples from food-related illnesses across multiple outbreaks. While data from FoodNet aids public health officials in conducting epidemiological investigations on food-borne outbreaks, PulseNet uses molecular subtyping to link seemingly unrelated sporadic multistate outbreaks to the same source, resulting in quicker outbreak identification and more rapid outbreak response. Together these two systems have proven vital to timely investigations to identity sources of multistate food-borne outbreaks in the United States (33).

Interagency Cooperation

Cross-sectoral cooperation has been crucial to the development of the FoodNet and PulseNet systems. The two major organizations charged with ensuring food safety in the United States are the USDA Food Safety and Inspection Service (FSIS) and the FDA. Before Congressional backing and financial support was made available for the FSIS and FDA to bring FoodNet and PulseNet to fruition, the U.S. framework for regulating the production of foods for mass consumption consisted of a patchwork of laws and regulations that often lagged far behind current scientific understanding of the risks of food-borne illness (33). In addition, the response of local and state government was often crisis driven and reactive, seldom taking a prophylactic approach to prevent the occurrence of outbreaks. Finally, funding was scarce, making local organizations dependent on third-party agencies to conduct the bulk of their research, thus impeding the potential for the FSIS and FDA to conduct the necessary research to inform their policy decisions. This made for a collection of food safety practices that lacked organizational infrastructure.

During this precollaborative period of food-borne disease control, the varying methods and standards
governing the several health and agricultural departments were rarely conducive to sharing information and methodology (33). Although they shared common goals of improving food safety, animal and human health agencies were governed by differing organization-specific cultures that guided and informed their regulatory stance on food safety issues.

Governmental mandates with associated funding not only fostered interagency cooperation, thus prompting the development of FoodNet and PulseNet, but they also promoted cooperating agencies to adopt a One Health approach by creating compatible and collaborating systems to detect related outbreaks in animal and human populations, allowing for a broader understanding of the ways in which pathogens move between the two populations. For instance, by facilitating rapid identification of outbreaks, PulseNet significantly curtails the effects of a food-borne outbreak by helping to inform and mobilize local and state officials early in an epidemic. In addition, epidemiological studies conducted by FoodNet can help inform policy changes, driving health officials to take a preemptive rather than merely reactive approach in the prevention of food-borne illnesses.

With legislative support, PulseNet and FoodNet have also been able to create a standard with which other food laboratories are developing surveillance systems, as is the case with the USDA VetNet, a PulseNet equivalent initiated by the USDA Agricultural Research Service. Similarly, the FDA’s National Antimicrobial Resistance Monitoring System (NARMS), which conducts routine surveillance of the retail meat supply, submits results of pulsed-field gel electrophoresis patterns on all Salmonella isolates (34). The ability of PulseNet to access the VetNet and NARMS datasets facilitates improvements in the investigation of food-borne outbreaks by making available a greater number of isolates from known sources that can be compared and evaluated for the presence of common pathogens (35).

Finally, the linking of databases between PulseNet and FoodNet, as well as the collaboration with other surveillance systems, creates a gold standard surveillance system that can reliably measure even minute changes in disease incidence and occurrence (36). This sensitivity becomes increasingly important with the emergence and reemergence of food-borne illnesses (i.e., multidrug-resistant pathogens, cholera, etc.). The legislative backing and federal funding available to support these entities is directly linked to their success and expansion, as well as their ability to employ One Health initiatives in their efforts to control the spread and burden of food-borne illnesses.

Case Study Summary
This case example demonstrates that a One Health outcome is more likely when:

- Federal funding and legislative backing mandate collaboration and information sharing.
- Cooperating agencies have clearly defined roles and responsibilities.
- Collaboration between agencies encourages the development of compatible data systems, streamlining the sharing of information and efficiency with which systems help to curtail food-borne outbreaks.

CASE STUDY 5: KENYA ZOONOTIC DISEASE UNIT
Background
In 2005, the International Health Regulations (IHR) were revised by the WHO to explicitly require that each country establish a system for surveillance of zoonoses and potential zoonoses, as well as a mechanism for coordinating all relevant sectors in the implementation of IHR (37). Like most countries, Kenya had not focused on surveillance for zoonotic diseases in either human or animal populations. Human surveillance was under the auspices of the Kenyan Ministry of Public Health and Sanitation (MOPHS) and veterinary surveillance was conducted by the Kenyan Ministry of Livestock Development (MOLD); the two entities did not have formal, established methods of exchanging information.

During 2006-2007, Kenya experienced an outbreak of Rift Valley fever (RVF) that resulted in substantial human and animal morbidity and mortality (38). Cross-sectoral communication was not optimal during the outbreak response, and this led to duplication and redundancy that may have had a negative impact on effective handling of the response (39).

During this same time period, HPAI H5N1 was emerging as a potential global health threat of significant proportion and all countries were being tasked to develop pandemic preparedness plans that encompassed both human and animal health. Although the virus had not yet been reported in Africa, national and international authorities were braced for imminent emergence.

Kenya responded to the threat of H5N1 by forming a National Influenza Task Force (NITF). The NITF assessed lessons learned during the RVF response and recognized the need for a more focused cross-sectoral group dedicated to zoonotic disease response that
effectively linked animal and human health experts. To that end, the NITF invited membership from government ministries of public and animal health, military, police, the National Disaster Operation Center, public universities, and research institutions.

In 2008, the NITF expanded its mission to form the Zoonotic Technical Working Group (ZTWG), a multisectoral alliance that includes representatives from public health (MOPHS), animal health (MOLD), and partner organizations including the WHO, FAO, Kenya Medical Research Institute, Kenya Wildlife Services, CDC-Kenya, Kenyan Field Epidemiology and Laboratory Training Program, and National Museum of Kenya. The ZTWG meets quarterly and is chaired on a rotating basis by either the Director of Veterinary Services (representing MOLD) or the Director of Public Health and Sanitation (MOPHS).

Staff working in the ZTWG saw the need to establish a zoonotic disease office that could provide leadership, expertise, and service in laboratory and epidemiological science, bioterrorism preparedness, applied research, surveillance, outbreak response, and policy formation. A memorandum of understanding was signed between directors representing MOPHS and MOLD on August 2, 2011, in support of the formation of the Zoonotic Disease Unit (ZDU) within the government of Kenya. The vision of the ZDU is to provide an effective, efficient, multidisciplinary, and multisectoral surveillance and response system that reduces the burden, risk, and spread of zoonotic diseases in Kenya.

The ZDU is made up of a medical epidemiologist, a veterinary epidemiologist, a data analyst, and administrative staff. Other subject matter experts (such as microbiologists, social economists, and entomologists) are contracted to work with the ZDU as needed. The ZDU serves as the secretariat of the ZTWG, which in turn provides guidance and leadership to the ZDU. Both epidemiologists deployed to the ZDU remain part of their respective ministries and report to their respective heads. The epidemiologists share the leadership of the ZDU equally.

**Case Study Summary**

This case example demonstrates that a One Health outcome is more likely when:

- A series of external threats or internationally mandated actions imposes cross-sectoral collaboration.
- Leadership rotates rather than being monopolized by one sector.
- Incremental outputs receive favorable responses nationally and by international organizations.

**DISCUSSION**

The case studies above describe recent events that required cross-sectoral collaboration in order to most effectively respond to global, One Health challenges. The influenza examples, both H5N1 and H1N1, illustrate how a common threat provided the impetus to open lines of communication among partners that have not historically been frequent collaborators. It is to the credit of the various sectors that they recognized the necessity to collaborate with a wide variety of groups in order to respond within their own sector. To a large extent, these collaborations occurred before they were officially mandated, in spite of inequitable funding among the various agencies.

Nonetheless, it can be argued that the actual depth and resiliency of the One Health collaborations were never really tested because H5N1 did not become a pandemic; the transfer of virus remained as bird to human rather than becoming a human-to-human infection. The emergence of pH1N1 in 2009 did, however, challenge the level of trust that had been established among individuals in the separate agencies during H5N1 response planning. Although government agencies were operating under different mandates, U.S. entities were able to build on individual relationships to mount an integrated One Health collaborative approach that crossed bureaucratic boundaries.

**Inequalities among Sectors as a Barrier to Collaboration: Wildlife Agencies**

The wildlife health/wildlife management community has struggled with the One Health concept as being focused primarily on human health and secondarily on domestic animal health, while enhanced wildlife and ecological health as a goal appears to be an afterthought (40). The perception in wildlife agencies is that the environment is only considered part of the One Health concept in that environmental changes are threatening human health; i.e., the environment is considered a threat rather than something that can enhance human health or something that has its own inherent value. Nonetheless, several wildlife entities, including the American Association of Wildlife Veterinarians, the Wildlife Conservation Society (40), EcoHealth Alliance (41), and the National Park Service (42), have incorporated the One Health concept into their strategic planning. However, these individual initiatives have yet to move forward in promoting a
collective mission in that sector. Furthermore, as we illustrate, agreement on a common set of core values, especially when accompanied by funding, that includes the mutual recognition of the importance of human, animal, and ecosystem health will enable agencies to overcome this apparent impediment to collaboration.

Inequalities among Sectors as a Barrier to Collaboration: Imbalance of D.V.M.’s and M.D.’s

The American Veterinary Medical Association (AVMA) and the Wildlife Conservation Society were early promoters of One Health through publication of the “AVMA Task Force Report on One Health” (43) in 2007 and the wide endorsement of the Wildlife Conservation Society’s Manhattan Principles (44) in 2004. Although the human medical community has always been functionally engaged, leadership for One Health continues to be predominantly drawn from the animal health sector. Efforts to overcome this barrier are currently being addressed on several fronts, including (i) the loosely formed One Health Interagency Working Group, where more than a dozen federal agencies, including human health agencies, regularly communicate to exchange information under a One Health banner; (ii) CDC placement of international staff that includes D.V.M.’s, M.D.’s, and Ph.D.’s to work specifically at the interface between animal and human health; and (iii) the inclusion of One Health-focused sessions at meetings and conferences that focus on human health (48).

Team Building as a One Health Core Competency

It may be that cross-agency collaborations referred to as a One Health approach ultimately share the most basic team-building challenges, including building trust, not avoiding the difficult issues or conflicts, commitment to outcome, agency accountability, and attention to results (45). Starting in 2009, several parallel initiatives, including the Rockefeller Foundation project with the University of Minnesota (http://www.rockefellerfoundation.org/grants/grants-and-grantees/384ae11d-d234-4726-ad1b-c647de7ac1e9), the U.S. Agency for International Development Emerging Pandemic Threats RESPOND Program (46), and the Stone Mountain Meeting Training Workgroup (47), have independently tackled the task of defining core competencies for various levels of One Health practitioners. It is of note that each group identified communication and team-building skills as fundamental core competencies. The Stone Mountain Meeting Workgroup took the additional step of aggregating training opportunities that address the core competencies. In the online course listing, a large number of the resources identified as “One Health” focus on leadership, communication, and organizational management skills (47). A successful One Health approach will require that representatives from both animal and human health identify the common mission and goals and form the teams that can achieve these goals.

We also believe that individual leadership of those who participate in One Health work or projects is essential. Specifically, the following individual characteristics are important:

- A commitment and willingness to collaborate
- An ability to think beyond the boundaries of one’s agency or organization
- An ability to represent a broad array of interests
- Decision-making authority or influence within one’s agency or organization
- Experience in leadership roles and collaborative processes
- The science or knowledge capacity, or active engagement in One Health activities

CONCLUSION

Bureaucratic boundaries are formidable, and they will maintain because each sector has a unique purpose and area of functionality. Nonetheless, the case examples in this review illustrate that bureaucratic boundaries can be overcome and a One Health approach can be viable. Successful operationalizing of One Health is more likely when agencies with different mandates are responding to a common external threat; adequate funding is available to enable each sector to contribute to the outcome; individual entities are willing to accept nontraditional liaisons within their organizations; key individuals have established trusting relationships with counterparts in other agencies; optimal outcomes are mutually agreed upon and are science based; leadership rotates among agencies; and the value of a collaborative One Health approach is visibly demonstrated.

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