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Enhancing Global Security through Infectious Disease Threat Reduction

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SUMMARY POINTS

- Senior leaders across sectors of government share a vital interest in reducing global threats posed by infectious disease outbreaks, whether naturally occurring or resulting from a deliberate or accidental release.
- Reducing these threats requires a combination of prevention-focused programmes that minimize the likelihood of disease outbreaks, and capacity-building activities aimed at mitigating the effects of outbreaks through early detection and rapid response.
- Prevention of deliberate biological attacks requires improvements in the governance of life-science research and dual-use biotechnology, to avoid exploitation for weapons purposes. The prevention of naturally caused outbreaks requires work at the human–animal interface to tackle emerging infectious diseases at the source.
- To improve early detection of disease outbreaks, the challenge is to establish an integrated global biosurveillance system and to develop improved diagnostic tests for characterizing outbreaks and understanding their source.
- Strengthening capabilities for rapid and effective response to biological threats of international concern requires increased transparency, management of risks posed by infectious diseases at the human–animal interface, improved coordination of international responses to disease outbreaks and capacity-building for rapid development and dissemination of medical countermeasures.
- In working to strengthen global health security, multi-sectoral collaboration is essential to ensure that the combined resources and expertise of the health and security sectors are effectively used. Improved coordination among global health security initiatives is also necessary to efficiently match resources with needs, avoid redundant efforts and identify gaps.

INTRODUCTION

Reducing global threats posed by infectious disease outbreaks – whether naturally caused or resulting from a deliberate or accidental release – requires efforts to prevent outbreaks from occurring and, if prevention efforts fail, to mitigate the effects through early detection and rapid response.

These global health security activities are operating within an evolving threat landscape. In efforts to reduce the risk of deliberate attacks, the focus has shifted away from state bioweapons programmes to the potential for biological attacks by non-state actors. With regard to naturally caused outbreaks, new and re-emerging infectious diseases – such as H7N9 and MERS-CoV – pose an increasing threat and will have an impact on national and global security over the next few years. The emergence and spread of infectious disease results as much from changes in human behaviour – including lifestyles and land-use patterns, increased trade and travel – as from mutations in pathogens.

To meet these challenges, the public health and security sectors have traditionally worked independently, using different approaches. However, cooperation between them is essential. Reducing global risks posed by infectious disease outbreaks – whether naturally occurring or deliberately caused – is a challenging, complex task; the combined expertise of both sectors is necessary to meet this challenge. Moreover, limited available resources must be shared across sectors to support the broad scope of threat reduction activities necessary for strengthening global health security.

The relationship between the health and security sectors has evolved, as they have begun to engage in discussions about areas of shared interest. However, this relationship must continue to move forward. Since late 2009, there has been active dialogue and sustained engagement across both sectors, specifically in the context of the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. While there has been some progress in cross-sectoral cooperation, it has been limited. One obstacle has been the continued reluctance of the health community to highlight security concerns pertaining to infectious disease outbreaks and to frame infectious disease threats in security terms. As a result, while the security sector has considerable funds at its disposal, and though the two sectors share many goals, it has to date provided limited funding directly to implementation bodies in the health sector.

The health and security sectors share the goal of all countries achieving compliance with the International Health Regulations (IHR) (2005), and it is a guiding framework for both sectors. It has been agreed and enshrined in law for IHR (2005) states parties to report and respond to potential public health events of international concern. However, to achieve this aim, capacity building in many countries will be required. Capacity building is therefore a shared concern among the health biosecurity sectors, and there is still much work to be done on this front.

Ensuring compliance with the IHR and reducing global threats posed by infectious disease outbreaks requires the full spectrum of threat-reduction activities – ranging from prevention-focused programmes that minimize the likelihood of disease outbreaks to capacity-building activities aimed at mitigating the effects of outbreaks through early detection and rapid response.

On 11 June 2013, the Chatham House Centre on Global Health Security hosted a one-day high-level roundtable convening senior leaders from the security, human health and animal health communities, representing 20 countries and international organizations. The meeting, on 'Enhancing Global Security: Multi-Sectoral Approaches to Mitigating Infectious Disease Threats', was comprised of a series of panel discussions to encourage participants to share perspectives and develop tangible approaches, which, if implemented over the next five years, could reduce global threats posed by infectious disease outbreaks. This paper, which was prepared to inform and help frame the discussions, discusses global health security activities over the past five years in terms of outbreak prevention, detection and response.

PREVENTION

For the purpose of this discussion the term 'prevention' means prevention of and preparation for avoidable epidemics, including naturally occurring outbreaks and intentional or accidental releases. Prevention of deliberate biological attacks requires improvements in the governance of life-science research and dual-use biotechnology, to prevent exploitation for weapons purposes. The prevention of naturally caused infectious disease outbreaks requires work at the human–animal interface to prevent pathogens from reaching human populations.

Challenge: rapid advances in biotechnology, managing risks

Life-science governance strategies geared toward prevention of biological attacks must confront numerous challenges. First, rapid advances in biotechnology make effective governance of the life sciences a moving target. For example, advances in gene synthesis technology and synthetic biology have raised concerns about the possibility of a synthetic pathogen genome.[1] This could make it easier to obtain deadly viruses whose distribution is currently restricted.

A good model for managing this challenge is the promulgation of best practices among gene synthesis companies. Gene synthesis companies have voluntarily taken on the responsibility to screen customer orders to ensure that they are not inadvertently providing the genetic building blocks of a dangerous pathogen.[2] This started in the United States and Europe, but the practice is currently spreading to Asia and worldwide.

Challenge: global spread of biotechnology, managing risks

A second challenge is the expanding role of biotechnology in the global bioeconomy. Dual-use biotechnology tools, materials and knowledge are widely distributed, and research on potentially dangerous pathogens takes place at thousands of facilities worldwide. While these materials and tools are being used for legitimate research, their global spread lowers the bar for access and increases the risk of exploitation for weapons purposes. It is necessary to ensure that regulatory structures and laboratory biosecurity practices are in place to manage associated risks as dual-use biotechnology spreads around the world.

A successful example of programmes to manage these risks is laboratory security upgrades in Africa, which are being carried out through coordinated investments by the United States and Canada. The Canadian Global Partnership Program (GPP) is investing in laboratory security in West Africa, including biosecurity upgrades at a veterinary facility in Nigeria, and biosecurity and biocontainment upgrades at three facilities in Ghana's Veterinary Services Directorate lab network. To ensure the sustainability of biosafety and biosecurity upgrades, GPP is collaborating with the US Centers for Disease Control and Prevention (CDC) to help establish the African Center for Laboratory Equipment Maintenance (ACLEM) in Nigeria, which will provide indigenous capacity to maintain biosafety equipment. The US Departments of Defense and State are investing in East Africa through projects that are focused on biosafety and biosecurity upgrades at medical and veterinary research institutes in Kenya and Uganda. These projects include work to strengthen physical security at these facilities and build capacity for safe waste disposal.[3]

The European Union Chemical, Biological, Radiological and Nuclear (CBRN) Centres of Excellence have also been working to address the challenge posed by the global spread of biotechnology. For example, these regional centres are working with countries in Southeast Asia

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1 Garfinkel, M.S., Endy, D., Epstein, G.L., and Friedman, R.M. (October 2007), 'Synthetic Genomics: Options for Governance' (Rockville, MD: J. Craig Venter Institute), http://www.jcvi.org/cms/research/projects/syngen-options/.

2 International Association Synthetic Biology, 'Code of Conduct for Best Practices in Gene Synthesis', 2 November 2009, http://www.ia-sb.eu/go/synthetic-biology/synthetic-biology/code-of-conduct-for-best-practices-in-gene-synthesis/.

3 Telephone interviews conducted by the authors.

and Eastern Europe to promote an understanding of laboratory biosafety and biosecurity concepts, and to support the development of national legislation and regulation in these areas.[4]

Challenge: promoting responsible conduct of research

A third challenge is ensuring the responsible conduct of research, both at the institutional level and at the level of individual researchers. At the institutional level, there have been difficulties in making decisions about research funding and approval of publication. This was illustrated by the recent controversy over publication of research on the H5N1 avian flu virus, which demonstrated how the genetic code of this lethal virus could be changed to enable airborne transmission among humans. This controversy demonstrates that institutions responsible for research funding and oversight have not yet found a balance between the potential benefits to public health and the risk that the results of this research could be exploited for weapons development. Similar controversies are likely to arise in the future as life scientists continue to push the limit of what is possible in the laboratory.[5]

At the level of individual researchers, the key challenge is biosecurity education and instilling a culture of responsibility. Such a code should emphasize the importance of evaluating potential risks associated with planned experiments and encourage consideration of alternative lower-risk approaches to answer scientific questions. To date, biosecurity codes of conduct have yet to be developed and implemented in most countries, and biosecurity has not been incorporated into the training of life scientists at most universities.

Indonesia has taken a leading role in this regard by developing a national code of conduct on biosecurity, which will be incorporated into the biological science curriculum nationwide.[6] The EU CBRN Centres of Excellence are also working to promote a biosecurity and biosafety culture of responsibility by establishing an international network of universities and research institutes focused on this issue. This network will work to raise awareness among scientific researchers of dual-use concerns associated with biotechnology, and to integrate biosafety and biosecurity training into university curricula. Finally, there is an emerging international consensus about the value of a biosecurity code of conduct, and this goal is being discussed within the Biological Weapons Convention (BWC) Intersessional Process.[7]

Challenge: preventing natural outbreaks at the source

In preventing natural infectious disease outbreaks, the challenge – as articulated by David Heymann – is to 'shift the paradigm from detection, assessment and response further upstream – to prevention of emerging infections at the source.'[8] The key factor in this view of prevention is that most human epidemics result from transmission from animal populations to humans.[9] By intervening early in this transmission pathway, it may be possible to prevent some pathogens from reaching the human population. Disease surveillance and response tools, which are discussed in

4 CBRN Centres of Excellence: An initiative of the European Union, http://www.cbrn-coe.eu/.

5 Tu, M., 'Between publishing and perishing? H5N1 research unleashes unprecedented dual-use research controversy', NTI Building a Safer World: Articles, 3 May 2012, http://www.nti.org/analysis/articles/between-publishing-and-perishing-h5n1-research-unleashes-unprecedented-dual-use-research-controversy/.

6 Sudoyo, H., 'Indonesia and the Global Challenges of Biological Control: From Jakarta to Geneva', presentation at conference on 'The Global Challenge of Biological Controls', UNIDIR, Geneva, 8–9 April 2010.

7 Report of the Meeting of States Parties to the Biological Weapons Convention (Geneva: BWC Implementation Support Unit, December 2012).

8 Heymann, D. and Dixon, M., 'Preventing the Emergence of Emerging Infectious Diseases: The Value of a One Health Approach', chapter in Ronald Atlas and Stanley Maloy (eds), *One Health: People, Animals, and the Environment*, ASM Press (Washington, DC: ASM Press, forthcoming, autumn 2013).

9 According to the US Centers for Disease Control and Prevention: 'Approximately 75% of recently emerging infectious diseases affecting humans are diseases of animal origin; approximately 60% of all human pathogens are zoonotic.' US Centers for Disease Control and Prevention, Emerging and Zoonotic Diseases – at a Glance, http://www.cdc.gov/ncezid/.

greater detail below, could be used as a part of this prevention strategy, but this would require adjusting their stated purpose.

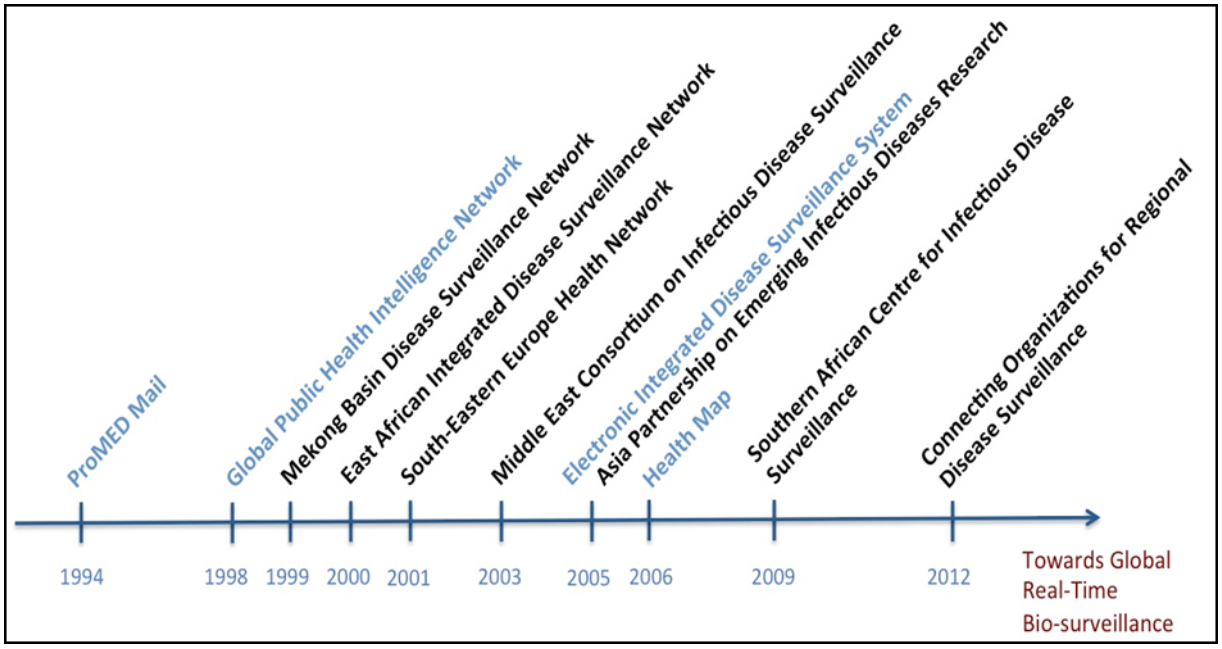
DETECTION

The detection aspect of strengthening global health security involves early detection, characterization, reporting and communication with national leaders, with the goal of real-time biosurveillance. In this regard, the challenge is to develop an integrated global disease surveillance system that can detect infectious disease events at an early stage before they evolve into an epidemic.

Challenge: building an integrated real-time biosurveillance system

Some of the components that could be used to assemble an integrated global disease surveillance system have been developed over the past two decades (See Figure 1). Early disease surveillance tools took the form of ProMED Mail – an internet-based, public reporting system for rapid international dissemination of information on infectious disease outbreaks – and the Global Public Health Intelligence Network (GPHIN), which monitors news sources in six languages to detect early signs of potential disease outbreaks, and which played a role in the detection of SARS in 2003. The establishment of these digital tools in the 1990s was followed by the creation of six regional disease surveillance networks, located in the Middle East, Africa, Southeast Asia and Eastern Europe.

Figure 1: Evolution of disease surveillance capabilities



Note: Black text indicates dates when disease surveillance networks were established; blue text indicates dates when electronic disease surveillance tools were introduced.

Source: Author, based on CORDS Strategic Plan (available at http://www.nti.org/about/projects/CORDS/), GPHIN (available at http://www.phac-aspc.gc.ca/gphin/), ProMED Mail (available at http://www.promedmail.org), HealthMap (available at http://healthmap.org/en/) and Electronic Integrated Disease Surveillance System (EIDSS) (available at http://www.sacids.org/kms/resources/Russia.pdf).

More recently disease surveillance initiatives have been developed with the aim of integration on a global scale. In 2012, Connecting Organizations for Regional Disease Surveillance (CORDS) was established to integrate the six existing regional networks, increase their capacity and facilitate

information sharing among them. CORDS also aims to help establish new regional networks, with the goal of integrated global coverage. In parallel, several infectious disease data reporting systems have been developed that provide individual countries with a tool for reporting to the World Health Organization (WHO) and the World Organization for Animal Health (OIE), for example, the Electronic Integrated Disease Surveillance System (EIDSS).[10] One of these platforms could provide an opportunity for countries around the world to adopt disease-reporting systems that are interoperable. The ultimate goal is to integrate a diverse range of information sources into a networked global system that is capable of global real-time biosurveillance.

Challenge: diagnostics and disease characterization

Another challenge is to develop molecular diagnostic capacity and to integrate the data from these tests into disease surveillance. Improvements in capabilities to detect novel severe respiratory diseases – such as MERS CoV and H7N9 – have been made possible by investments in diagnostics over the past 10 years. These investments were made by the security sector and were initially motivated by concerns about bioterrorism threats. However, they have also benefited the health sector, as evidenced by the response to recent infectious disease outbreaks.[11] This is a good example of shared goals and resources across the health and security sectors.

Nevertheless, the MERS-CoV outbreak also demonstrates a challenge. Information about this outbreak has been shared with WHO, and yet the international community is still facing technical challenges in characterizing this novel virus. MERS-CoV belongs to the same family as SARS, but many important questions about the virus – including its source – remain unknown. Human cases are thought to have originated from contact with animals, but the prevalence of this virus among animal populations is unknown. Preliminary evidence suggests that there has been limited human–human transmission, but it remains unclear whether the virus is capable of sustained transmission among humans. These unknowns make it difficult to accurately assess risk and to take measures to contain the disease.[12]

Attributing the source of a disease outbreak is a goal that is shared by the security and health sectors, but they have different definitions for attribution and separate approaches. Given that neither community has mastered this challenge, and that the relevant scientific tools are still under development, there is potential for cross-sectoral collaboration to strengthen attribution capabilities.

10 USA Defense Threat Reduction Agency, Electronic Integrated Disease Surveillance System (EIDSS), 14 July 2011, http://www.sacids.org/kms/resources/Russia.pdf; Wahl, T. and Burdakov, A. (2007), 'Electronic Integrated Disease Surveillance System (EIDSS)', *Advances in Disease Surveillance*, Vol. 2, No. 4, p. 171, http://www.isdsjournal.org/articles/918.pdf.

11 Heymann, D. (2013), 'Emerging infections in perspective: Novel coronavirus and H7N9 influenza', Chatham House, http://www.chathamhouse.org/media/comment/view/190809.

12 Alwan, A., Mahjour, J. and Memish Z. (2013), 'Novel coronavirus infection: Time to stay ahead of the curve,' *Eastern Mediterranean Medical Journal*, Vol. 19, suppl. 1, pp. s3–s4, http://applications.emro.who.int/emhj/v19/Supp1/EMHJ_2013_19_Supp1_S3_S4.pdf; Fukuda, K. (2013), 'Emergence of novel coronavirus: Global context', *Eastern Mediterranean Medical Journal*, Vol. 19, suppl. 1, pp. s5–s6, http://applications.emro.who.int/emhj/v19/Supp1/EMHJ_2013_19_Supp1_S5_S6.pdf.

RESPONSE

Capabilities for rapid and effective response to biological threats of international concern should include the capacity to identify the source of disease outbreaks and coordinated efforts to contain them.

Challenge: transparency and information-sharing

A successful response to the emergence of novel pathogens requires international cooperation and information-sharing among animal and human health sectors, ministries of health, researchers focused on characterizing the pathogen and clinicians working to save lives.

The response to the H7N9 outbreak in China is an excellent example of the power of transparency and information-sharing with the international health community.[13] China's readiness to share information about the outbreak, including DNA sequences, has allowed the global health community to rapidly organize a coordinated response, which has included identification of the putative outbreak source within live poultry markets in China,[14] execution of outbreak-containment measures, and sharing of H7N9 samples with designated high-containment research facilities to enable development of an H7N9 vaccine.[15] This transparency, coupled with improved diagnostic tools, has enabled a marked improvement over the response to SARS in 2003.

Challenge: working at the human–animal interface

The MERS-CoV and H7N9 outbreaks are examples of viruses that have emerged at the human–animal interface and that have the potential to evolve into a form that is transmissible among humans. Continued research is required to manage the public health risks posed by infectious diseases at the human–animal interface. As discussed above, existing disease surveillance and response mechanisms can also applied to prevention at the source.

A good model for this approach is the work on H5N1 by the Asian Partnership on Emerging Infectious Diseases Research (APEIR). This network was established in 2005 to promote collaborative regional research on avian influenza and to advocate for changes in agricultural and public health practices based on this research; it has since expanded to include all emerging infectious diseases in the region.[16] APEIR's work on avian influenza has included scientific research to characterize the H5N1 virus and its transmission pathway from wild bird populations to poultry farms and ultimately to human populations. Based on this research, APEIR makes policy recommendations to improve influenza containment practices, prevent infection from progressing via animal hosts to human populations, and minimize the economic damage to poultry farmers that results from large-scale culling. For example, APEIR is applying lessons learned from the H5N1 outbreak to recommend risk-management strategies for H7N9. These include improving practices on farms to protect poultry from infection that can occur through interaction with wild bird populations, and surveillance of wild bird populations coupled with molecular characterization of the viruses carried by these populations.[17]

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13 Telephone interviews conducted by the authors. See also 'China—WHO Joint Mission on Human Infection with Avian Influenza A(H7N9) Virus,' Mission Report, WHO, 18 – 24 April 2013, http://www.who.int/influenza/human_animal_interface/influenza_h7n9/ChinaH7N9JointMissionReport2013u.pdf.

14 'Bird flu in live poultry markets source of viruses causing human infections,' Homeland Security News Wire: Public Health, 15 May 2013, http://www.homelandsecuritynewswire.com/dr20130514-bird-flu-in-live-poultry-markets-source-of-viruses-causing-human-infections.

15 Schnirring, L., 'Groups take next H7N9 vaccine step amid questions about summer spread,' CIDRAP News, 10 May 2013, http://www.cidrap.umn.edu/cidrap/content/influenza/h7n9/news/may1013china-ms.html.

16 Asia Partnership on Emerging Infectious Disease Research, http://www.apeiresearch.net/main.php.

17 APEIR, 'Combating H7N9: Using lessons learned from APEIR's studies on H5N1', Press Release, 18 April 2013, http://www.apeiresearch.net/document_file/news_20130418040221-1.pdf.

Another good model for working at the human–animal interface is the Kenya Zoonotic Disease Unit (ZDU). Its mission is to prevent and control zoonotic diseases in Kenya, through active collaboration among practitioners in the public health, animal health and wildlife services communities. The ZDU is based at the nexus between Kenya's Ministry of Public Health and Sanitation and its Ministry of Livestock Development, and its technical staff is seconded from both ministries. A permanent ZDU office was constructed in 2012 with financial support from the US Departments of State and Defense and the CDC.[18] Other countries in the region recognize the value of this model, and have expressed an interest in replicating it.[19]

Challenge: coordinated international response

A third challenge in mounting an effective response to infectious disease outbreaks relates to the question of how the international community can ensure a rapid response while the process of capacity building is still underway in many countries.

The response to the 2012 outbreaks of Marburg and Ebola haemorrhagic fevers in Uganda demonstrated the role of the international community in supporting partner countries during infectious disease events of global concern. The response included Médecins Sans Frontières, the CDC, the US Agency for International Development, the African Field Epidemiology Network, the Uganda Red Cross, and WHO.[20] However, while the international community can play a valuable role in outbreak response, the experience in Uganda demonstrates the need for improved coordination, communication and collaboration among such organizations in a response setting.[21]

Challenge: rapid development and dissemination of medical countermeasures

Finally, to face known and unknown infectious disease threats – whether delivered by nature or engineered in a laboratory – capacity is needed to develop and produce medical countermeasures quickly so they can be delivered within months, weeks or days of an outbreak. After the 2009 H1N1 outbreak, it took eight months to develop a vaccine that could be delivered to the public. In responding to disease outbreaks, time is of the essence; the faster medical countermeasures can be developed and distributed, the more rapidly the disease can be contained and the more lives can be saved.[22]

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18 Republic of Kenya Zoonotic Disease Unit (2013), About ZDU, http://zdukenya.org/about-zdu/.

19 Telephone interviews conducted by the authors.

20 WHO, 'Uganda: Quick detection, vigorous public health response hasten end of Ebola outbreak,' Regional Office for Africa: Press Release, 19 October 2012, http://www.afro.who.int/en/media-centre/pressreleases/item/5049-uganda-quick-detection-vigorous-public-health-response-hasten-end-of-ebola-outbreak.html; WHO, 'Marburg haemorrhagic fever in Uganda—update,' Global Alert and Response (GAR): Disease Outbreak News, 23 November 2012, http://www.who.int/csr/don/2012_11_23_update/en/.

21 Telephone interviews conducted by the authors.

22 Weber, A. (2010), 'DoD Biodefense Challenges and Accomplishments,' presentation at conference on 'The State of Biopreparedness: Lessons from Leaders, Proposals for Progress', http://www.upmchealthsecurity.org/website/resources/multimedia/conference-videos/2010_biopreparedness/10weber.html.

HIGH-LEVEL INITIATIVES: NEED FOR COORDINATION

There are numerous international organizations and initiatives that are actively engaged in global health security activities (see Table 1). The challenge is to improve coordination among them to ensure that resources are efficiently matched with needs, avoid redundant efforts and identify gaps.

Table 1: Examples of institutions engaged in global health security activities

	Organization	Representative global health security activity
Intergovernmental	Global Partnership	Expanded scope in 2010 to include biological threat reduction activities.
	Global Health Security Initiative	Global Health Security Action Group work includes: health-security cross-sectoral risk assessment, development of a common platform for disease reporting, molecular diagnostics quality assurance, development of global medical countermeasures infrastructure, and pandemic influenza preparedness.
	Australia Group	Maintains lists of controlled technologies that require licensing for export, including biological pathogens and dual-use biotechnologies.
	Biological Weapons Convention	Intersessional Process includes focus on international cooperation to support: disease detection and response capacity-building and implementation of laboratory biosafety and biosecurity measures.
	World Organization for Animal Health	Global Early Warning System (GLEWS) for major animal diseases, a joint endeavour with FAO and WHO.
	World Health Organization	Coordinated incident response though the Global Outbreak Alert and Response Network, and support for member-state implementation of the International Health Regulations. GLEWS.
	Food and Agriculture Organization	Emergency Centre for Transboundary Animal Diseases. GLEWS.
	United Nations Security Council	Resolution 1540 is a binding obligation on UN member states to take effective measures against the proliferation of weapons of mass destruction, their means of delivery, and related materials.
International	Connecting Organizations for Regional Disease Surveillance	Integrates six existing regional disease surveillance networks, and seeks to expand geographic reach, with the aim of a global network.
	European Commission	CBRN Centers of Excellence are working with countries to promote a biosecurity and biosafety culture, and to develop national legislation and regulations in these areas.
	African Union	Science and Technology Framework for The Detection, Identification and Monitoring of Infectious Diseases of Plants, Humans and Animals in Africa.

The 2012–13 WHO IHR (2005) implementation stakeholder meetings are a good model for coordination at a regional level. They brought together WHO member states, technical partners and donors and provided a forum to identify successes, challenges and gaps in IHR implementation. The meetings also presented an opportunity for member states within the region to share resources and best practices. For example, at one of the meetings for the WHO African region Ghana offered to share knowledge and training materials in community-based surveillance; Ethiopia offered to share its experience with revising national legislation to facilitate IHR

compliance; and Kenya offered to share its expertise with working at the interface of animal and human health and with using electronic tools for integrated disease surveillance and response. Finally, a key strength of these meetings is that they establish clear roles for member states, WHO and donors in accelerating IHR implementation.[23]

Another successful example of coordination is the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. Under this initiative, countries undertake almost all capacity-building activities on a bilateral basis but with a high level of coordination, making sure to avoid redundant efforts. For example, the United States and Canada coordinate global health security investments in Africa.[24]

The next step is to integrate and coordinate global health security activities among these high-level initiatives.

23 WHO, 'Recommendations from the regional meeting for mapping of unmet country needs to accelerate the implementation of the International Health Regulations (2005) in the African Region,' Regional Office for Africa: Press Materials, 7 December 2013, http://www.afro.who.int/en/zambia/press-materials/item/5203-implementation-of-the-international-health-regulations-2005.html.

24 Telephone interviews conducted by the authors.

TAKING ACTION TO STRENGTHEN GLOBAL HEALTH SECURITY

Senior leaders across sectors of government share a vital interest in reducing global threats posed by infectious disease. In working to strengthen global health security, multi-sectoral collaboration is essential to ensure that the combined resources and expertise of the health and security sectors are effectively utilized. Improved coordination among global health security initiatives is also necessary to efficiently match resources with needs, avoid redundant efforts and identify gaps.

In pursuit of these goals, the Chatham House Centre on Global Health Security hosted a one-day high-level roundtable convening senior leaders from the security, human health and animal health communities, representing 20 countries and international organizations. The meeting comprised a series of panel discussions to encourage participants to share perspectives and develop tangible approaches, which, if implemented over the next five years, could achieve the ambitious goal of reducing global threats posed by infectious disease outbreaks.

A key objective of the meeting was to address the following themes:

- What are the major gaps and barriers to reducing the impacts of infectious diseases and other health threats?
- What is the importance and relevance of addressing infectious disease threats through collaborative efforts between the health and security sectors of government? What are the challenges in doing so? What are the consequences of not doing so?
- What are the roles of individuals and cross-border networks in successfully reducing the impact of infectious disease threats? How will success be measured?
- Can adherence to international measures for preventing, detecting and responding to health emergencies of international concern, such as the World Health Organization International Health Regulations, serve as a metric?
- How can this effort be linked to other high-level initiatives?

Chatham House is producing a meeting report to capture ideas discussed at the roundtable and is working with international partners to capitalize on the momentum generated by this meeting.

CONCLUSION

Reducing global threats posed by infectious disease outbreaks requires a combination of prevention-focused programmes that minimize the likelihood of disease outbreaks, and capacity-building activities aimed at mitigating the effects of outbreaks through early detection and rapid response.

This paper illustrates some of the challenges in prevention, detection and response, while presenting examples of programmes that are working to meet those challenges. It is hoped that this exercise will help inform future investment in global health security by providing examples of productive activities and identifying gaps where additional work is needed.

Tackling this broad range of challenges with the limited resources available will require a multi-sectoral approach that effectively uses the combined expertise and capabilities of the health and security sectors, as well as improved coordination among existing global health security initiatives.

ABOUT THE AUTHORS

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Professor Nigel Lightfoot CBE has a long and distinguished career in public health and global health security and is currently the Executive Director of Connecting Organizations for Regional Disease Surveillance. He is also an Associate Fellow at the Chatham House Centre on Global Health Security and a Member of the Kangaroo Group in the European Parliament. Professor Lightfoot was until recently the Chief Advisor for Emergency Response at the Health Protection Agency, leading on pandemic influenza, emerging health threats, CBRN response strategies and international relations in these areas. As expert adviser to the Chief Medical Officer, he has made significant contributions to the Global Health Security Network of the G7, where he was co-chair of the Risk Management and Coordination Working Group. He led the successful implementation of the Early Alerting and Reporting project for CBRN events.