

Biological Terrorism: International Dimensions



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EXECUTIVE SUMMARY

Biological security concerns, ranging from Mother Nature to man-made threats by state and non-state actors, transcend geographic regions. In 2018 and early 2019 alone, the Ebola virus has broken out in the Congo, cholera has afflicted war-torn Yemen, North Korea has augmented its biological warfare capabilities, and the Islamic State has demonstrated a willingness to pursue the use of biological weapons. These looming biological threats pose continual and unprecedented security challenges to those in the U.S. and abroad.

Is the international community prepared to identify, prevent, counter, and respond to future biological challenges? What are the past lessons, emerging risks, and needed strategies nationally, regionally, and globally?

The following report on “Biological Terrorism: International Dimensions” is based off the remarks given by experts from the security and health communities during a special seminar held on March 28, 2019 at the International Law Institute in Washington, D.C. The distinguished panel included: Dr. Larry Kerr (Director, Pandemics and Emerging Threats, Office of Global Affairs, U.S. Department of Health and Human Services); Professor Rita Colwell (Distinguished University Professor at the University of Maryland, College Park and Johns Hopkins University Bloomberg School of Public Health, and Senior Fellow, Potomac Institute for Policy Studies); Dr. Daniel M. Gerstein (Senior Policy Researcher, Rand Corporation, and Former Acting Undersecretary and Deputy Undersecretary in the Science and Technology Directorate, Department of Homeland Security); Dr. Gerald L. Epstein (Distinguished Research Fellow at the Center for the Study of Weapons of Mass Destruction, National Defense University); and Dr. Meghan Delaney (Chief of Pathology and Laboratory Medicine & Medical Director for Transfusion Medicine, Children’s National Medical Center, and Associate Professor of Pathology & Pediatrics, George Washington University). Professor Yonah Alexander (Director, Inter-University Center for Terrorism Studies, and Senior Fellow, Potomac Institute for Policy Studies) moderated the discussion and General Al Gray (Twenty-Ninth Commandant of the U.S. Marine Corps, and Senior Fellow and Chairman of the Board of Regents, Potomac Institute for Policy Studies) provided closing remarks.

Discussion revolved around topics related to the process of identifying, preventing, countering, and responding to biological terrorism. Some predominant themes included, but were not limited to, the following highlights:

- If implemented correctly, one single biological terrorist could bring about the same lethal damage on a population as a nuclear weapon deployed by a state.
- Governments should allocate more resources for prevention efforts as well as adequate resources for response strategies.
- Overseas biological events, such as the recent Ebola epidemic in West Africa, can pose a severe domestic threat for the U.S.
- The science and technology base, the industrial base, and the supply chains that underlie an individual's ability to produce a biological incident are thoroughly global and interconnected.
- International cooperation and diplomacy in both prevention and response settings is perhaps most crucial for ensuring global biosecurity.

SELECTED RECOMMENDATIONS

The following list provides selected recommendations, or “action items,” offered by the contributors to the special seminar on “Biological Terrorism: International Dimensions” held at the International Law Institute on March 28, 2019. The recommendations provided suggest ways to better identify, prevent, counter, and respond to biological threats.

IDENTIFYING BIOLOGICAL THREATS

1. Invest further in metagenomic testing.
2. Expend more resources into investigating artificial intelligence’s use as a forensic diagnostic tool.
3. Fortify the parts of the U.S. biodefense budget that revolve around the U.S.-led programs most critical to international bio-surveillance efforts.

PREVENTING BIOLOGICAL THREATS

4. Support preparedness planning in the interagency arena.
5. Encourage Finance Ministers and Health Ministers to coordinate directly with one another in order to better understand the specific financial needs for effective biodefense preparedness.

COUNTERING BIOLOGICAL THREATS

6. Focus the U.S. Biodefense strategy more on means, not merely ends.
7. Entrust one single entity, potentially the Vice President of the United States, to coordinate domestic biodefense efforts.
8. Continue to reinforce and update the Biological Weapons Convention (BWC) in the international arena to strengthen norms against the use of biological weapons by both state and non-state actors.
9. Empower the World Health Organization to continue to interface between international health systems and security systems.

RESPONDING TO BIOLOGICAL THREATS

10. Formulate relationships across a government's emergency preparedness sector to ensure that there is no confusion in the case of an actual biological event.
11. Incorporate a national standard of hospital preparation in the U.S. to ensure that all facilities are on the same page in the event of a biological attack.
12. Base contingency and emergency plans for U.S.-based health facilities upon preexisting programs.
13. Institute "war game" scenarios whereby government officials, hospital faculty, etc. can have the ability to practice responding to a biological terrorism event.

INTRODUCTION¹

Professor Yonah Alexander

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This report on “Biological Terrorism: International Dimensions” represents the approved contributions of experts at a seminar that was held at the International Law Institute on March 28, 2019. The following section provides a brief substantive and academic context from the perspective of the organizer and moderator of the event. The highlights offered focus on biological security concerns ranging from mother nature to man-made threats by state and non-state actors that transcend geographic regions.

Two key questions are relevant. First, is the international community prepared to identify, prevent, counter, and respond to biological threats? And second, what are the past lessons, emerging risks, and need strategies nationally and globally?

Consideration of these questions and other issues are based on selected findings of research and studies conducted over a half a century. In this connection, an overview of related academic work is also discussed. The views expressed in this report do not however necessarily reflect those of the participating institutions.

I. BIOLOGICAL SECURITY CHALLENGES: SOME PERSPECTIVES²

The national, regional, and global spectrum of biological challenges is limitless. Throughout recorded history, these infinite safety concerns stem essentially from two inevitable sources of enduring actual and potential dangers to individuals, communities, societies, and civilizations.

The first critical threat is caused by Mother Nature’s disasters, such as earthquakes, cyclones, and infectious diseases. The second concern are man-made menaces, including radicalism, terrorism, and war.

Mother Nature’s Biological Threats

Biological agents are micro-organisms too small to be seen with the naked eye and can include bacteria, viruses, and fungi. Some of the most serious viral agents are those that produce, for example, smallpox and yellow fever. Bacterial agents can induce the plague and Anthrax.

Biological weapons are difficult to control as they require a biological delivery system, or “vector,” that can make distribution difficult and dangerous. Furthermore, it seems likely that if terrorists

were to use a biological weapon, they would probably choose a bacteriological rather than a viral or rickettsial agent due to available countermeasures as well as the difficulty of cultivating viruses.

In addition, toxins, the poisonous byproducts of micro-organisms, plants, and animals, fall somewhere between biological and chemical agents as they are non-living substances. Toxins are relatively easy to manufacture and extremely virulent. Botulinum toxins, for example, can be more toxic than some nerve agents on an equal-weight basis.

Moreover, many agents are considered capable of spreading disease among humans, animals, or plants. Disease develops when people and animals are exposed to infectious micro-organisms or to chemicals which are produced by such organisms. After an incubation period, during which organisms are multiplied, the disease may even cause death. Mention should also be made of a number of fungal pathogens, such as smut of wheat, that is capable of destroying crops as well as resulting in famine and other costly diseases.

Despite these types of classification of biological challenges, historical and contemporary records provide extensive evidence regarding the nature, intensity, and health security implications of existing threats. These massive data sources also serve as a warning to beware of future catastrophic losses to human lives as well as political, social, economic, and strategic costs to those societies affected by biological pathogen attacks.

For example, in the 14th Century, the Black Plague wiped out 30-60 percent of Europe's population.³ Likewise, the 1918 influenza pandemic, regarded as the deadliest in modern times, killed an estimated 50 million people worldwide.⁴ And the Asian flu, originated in China in 1957-1958, resulted in the death of some one to four million people.⁵

Subsequently, the sudden Ebola outbreak that began in 2014 presented a major health security challenge nationally, regionally, and globally. This deadly disease has created unprecedented fear and anxiety over public safety, not only in parts of West Africa, but also the United States, Europe, and elsewhere. By the time the epidemic ended, some 28,000 Ebola cases were reported, resulting in some 11,315 deaths.

Sadly, the Ebola virus reappeared in August 2018 in the Congo, the 10th outbreak in four decades. This newest challenge is complicated by the continuing violence and war in the country, which has undermined the international community's efforts to fight the outbreak. By May 2019, the death toll had risen to more than 1,000 dead.⁶

Also, several other cotemporary health security challenges are noted. One is the Zika virus infection that is spread by mosquitos (which are also the vectors of many other diseases), sexually, and through blood transfusion as well as laboratory exposure.⁷ The disease causes microcephaly

and many other birth defects. Another grave humanitarian concern is the cholera epidemic that is expanding in war-torn Yemen where more than 100,000 cases were already recorded by WHO sources, a quarter million of them children. This disease is caused by bacteria from water or food contaminated with feces.

The second is the reemergence of the highly contagious and potentially life-threatening measles disease. This disease, which had been declared wiped in the U.S. nearly two decades ago, topped some 750 cases in 22 different states by May 2019.⁸

Man-Made Biological Threats

Supplementing Mother Nature's biological threats are man-made intentions and capabilities to deploy a wide-range of weapons against perceived or actual adversaries in the struggle for power within and among nations. From the dawn of history to modern times numerous theologians, philosophers, politicians, military strategists, scientists, academics, and other participants and observers of the world's security concerns have underscored the continued trends toward mass destruction capabilities.

Suffice to mention Homer's observation more than three thousand years ago: "The blade itself incites to violence" (*The Odyssey*, XVI). It is not surprising, therefore, that this primitive weapons and other tools that project psychological intimidation and physical power were utilized from "above" by state actors and from "below" by ethnic, racial, religious, tribal, and political entities as well as by "lone wolves."

More specifically, between the 11th and 13th centuries, the Hashashin (assassins), descendants of the Ismailis, systematically utilized daggers and swords in their martyrdom missions, targeting their Sunni adversaries and Crusaders in Persia and elsewhere in the Middle East. Although their battles lasted some two hundred years, their historical experience serves as a warning that "low-level" or "low-intensity" forms of man-made violence can be attractive, cost-effective, and ultimately successful even if the available weapons are rather primitive.

To be sure, over subsequent centuries numerous internal and external conflicts have demonstrated an evolutionary development of arms, such as guns, explosives, and more sophisticated arsenals of escalated violent capabilities. An insightful glimpse of this alarming reality was predicted by the military philosopher Antoine-Henri Jomini in the 19th century who asserted that "the means of destruction are approaching perfection with frightful rapidity."⁹ This assessment was brutally realized in the 20th and 21st centuries during which biological, chemical, and nuclear weapons were developed and deployed.

In this connection, two keen contemporary observations spring to mind. First is the view of General Matthew B. Ridgeway (USA) that was delivered at a speech in Cleveland, Ohio on

November 10, 1953: “There is still one absolute weapon... That weapon is man himself.”¹⁰ Second is the concern expressed by Daniel R. Coates, Director of National Intelligence (DNI), who in an open hearing of the U.S. Select Committee on Intelligence on February 13, 2018 offered his dire assessment that “the threat of state and non-state use of weapons of mass destruction will continue to grow” and that “some applications of biotechnologies may lead to unintentional health effects, biological accidents, or deliberate misuse.”¹¹

Indeed, in preparing for potential biological threats, the U.S. government is spending billions annually. Thus far at least, the federal efforts are incomprehensive and fragmented. Although the U.S. National Security Strategy released in December 2017 recognizes the need for broader defense against WMD challenges as well as coping with threats to public health, the National Security Presidential Memorandum (NSPM14), signed by President Trump in September 2018, is yet to establish biodefense policy priorities, including multi-year funding for relevant programs.

Several recent biological security concerns should also be noted. First, Department of Homeland Security (DHS) inspections reported that the U.S. government Biowatch website (biowatchportal.org) which would be used to coordinate federal responses to a bioterror attack is not safe, since it is leaking sensitive data.¹² Second, an American woman, Waheba Issa Dais, has pleaded guilty to planning terrorist attacks on behalf of an Islamic State group by distributing information on making explosives and biological weapons.¹³ Third, experts have warned that the unfolding humanitarian crisis in Venezuela is accelerating the reemergence of malaria, Chagas disease, dengue, Zika, and other infectious diseases and threatens to jeopardize 20 years of public health gains.¹⁴ And fourth, a January 2019 academic study conducted by Middlebury Institute of International Studies suggested that North Korea is accessing the work of foreign researchers to develop its existing biotechnology skills and construct the equipment needed to produce more biological weapons.¹⁵

Additionally, other countries in Europe and Asia have also raised concerns related to the looming biological threats and initiated selected policies and actions to minimize the risks unilaterally and multilaterally. For instance, the United Kingdom has warned that Daesh might weaponize Ebola and, jointly with Russia, has prepared a response to the use of biological weapons.¹⁶ Additionally, Germany hosted an international symposium on protection against biological warfare agents; Italy engaged its scientific community to deal with biological defense; France performed a nationwide drill to prepare for biological attacks; Pakistan issued export control lists of goods, technologies, and equipment related to nuclear and biological weapons;¹⁷ Taiwan outlined a five-year initiative to beef up its biological warfare defense as well as a plan to upgrade a biosafety laboratory;¹⁸ and Fiji conducted a regional biological weapons convention workshop with the aim of promoting the global benchmark of “The Biological Weapons Convention.”¹⁹

In sum, to prevent a potential “Black Plague”-like disaster as well as man-made terrorism, it behooves all nations to recall the warning in Shakespeare’s *King Lear*, “We make guilty of our disasters the sun, the moon, and stars, as if we were villains on necessity; fools by heavenly compulsions...” (Act 1, Scene 2).

More recently, Bill Gates has similarly asserted in a February 2017 Security Conference in Munich that “by the work of nature or the hands of a terrorist...an outbreak could kill tens of millions in the near future unless governments begin to prepare for these epidemics the same way we prepare for war.”²⁰

II. ACADEMIC CONTEXT

The emergence in the post-World War II era of the “Age of Terrorism,” coupled with the concerning escalation into a potential “Age of Super Terrorism” with all its frightening implications has generated infinite diversified published and unpublished literature by governmental, inter-governmental, and non-governmental bodies. The purpose of this section is merely to outline selected academic programs relevant to biological terrorism issues that were undertaken by the Inter-University Center for Terrorism Studies (IUCTS), the Inter-University Center for Legal Studies (IUCLS), and the International Center for Terrorism Studies (ICTS), and their earlier institutional structures during the past half-a-century. These activities consisted of seminars and publications seeking to provide insights into historical lessons learned, future potential threats, and offer recommendations for counter biological terrorism strategies by public and private entities.

To be sure, various academic initiatives have focused attention on the broader WMD challenges because of their linkages between biological, chemical, and nuclear challenges in terms of threats and responses. Thus, many of the seminars organized over the years in the United States and abroad have dealt with topics such as “Future Trends of Terrorism,” “Mass Destruction Attacks,” “Technology and Terrorism,” “Preventing Super Terrorism,” and “International Cooperation Against WMD.” Other seminars focused on both “chemical and biological weapons” as well as specifically on “biological terrorism.”

Several related WMD academic projects and publications are noteworthy. One project was developed by the “Task Force on the Prevention on Nuclear Terrorism,” co-sponsored by the Institute for Studies in International Terrorism (ISIT) at the State University of New York and the Nuclear Control Institute (NCI) in Washington, D.C. That effort resulted in the publication of two books: *Nuclear Terrorism: Defining the Threat* (Pergamon-Brassey’s, 1986) and *Preventing Nuclear Terrorism* (Lexington Books, 1987). Both volumes were co-edited by Paul Leventhal and Yonah Alexander.

A second academic effort in this field was the 1988 formation of an international multidisciplinary project on “Preventing Super-Terrorism,” administered by Professor Yonah Alexander,

Director of the Inter-University Center for Terrorism Studies at the George Washington University, and Professor Yuval Ne'eman, the Wolfson Distinguished Chair in Theoretical Physics at Tel Aviv University.

The purpose of this project, chaired by Professor Edward Teller of Lawrence Livermore Research Laboratory and Stanford University, was to both develop coherent counter-proliferation policies and increase governmental and public understanding of the risks of and responses to super-terrorism without providing sensitive information that could prove useful to potential perpetrators of terrorist acts involving weapons of mass destruction. An international task force of experts representing various disciplines and nationalities was responsible for formulating a critical analysis of the dimensions of the challenge and for developing a strategy to cope with it.

A third academic activity was the 2012 undertaking of a research project on a “WMD-Free Zone in the Middle” (WMDFZME). This ongoing effort is administered by the IUCTS in cooperation with the International Center for Terrorism Studies (ICTS) at the Potomac Institute for Policy Studies (PIPS) in Arlington, Virginia, and the Inter-University Center for Legal Studies (IUCLS) at the International Law Institute (ILI) in Washington, D.C. The objective of this project is to organize a series of seminars and to conduct research with experts from both the private and public sectors seeking to offer recommendations for ultimately achieving a Middle East free of WMD.

A more recent major academic initiative is the establishment of the bipartisan Blue Ribbon Study Panel on Biodefense, co-chaired by Senator Joseph Lieberman (Former United States Senator and Attorney General of the State of Connecticut; the Democratic Vice Presidential candidate in 2000; and currently Senior Counsel at Kasowitz, Benson, Torres, & Friedman LLP and Co-Chair of the Blue Ribbon Study Panel) and Governor Thomas J. Ridge (First Assistant to the President for Homeland Security, first Secretary of the U.S. Department of Homeland Security, former Governor of Pennsylvania, and currently Chairman of Ridge Global and Co-Chair of the Blue Ribbon Study Panel on Biodefense). Other panel members include former Secretary of Health and Human Services Donna Shalala, former Senate Majority Leader Tom Daschle, former Representative Jim Greenwood, and the Honorable Kenneth Wainstein. Established in 2014 with the institutional sponsorship of the Hudson Institute and the IUCTS and subsequently with the Potomac Institute for Policy Studies, the Panel assesses the spectrum of biodefense efforts from preparation to recovery and is developing recommendations for the U.S. government to improve and optimize these efforts. Its initial published reports include: “A National Blueprint for Biodefense: Leadership and Major Reform Needed to Optimize Efforts” (October 2015), “Biodefense Indicators: One Year Later, Events Outpacing Federal Efforts to Defend the Nation” (December 2016), and “Defense of Animal Agriculture” (October 2017).

To be sure, other studies related to WMD concerns resulted from more extensive academic projects. These contributions appeared in publications such as *Terrorism: An International Journal*

(Taylor and Francis, 1988-1991); *Terrorism: An International Resource File* (University Microfilm International, 1988-1991); *Technology Against Terrorism: Structuring Security* (Office of Technology Assessment, U.S. Congress, 1992); and *Super-Terrorism: Biological, Chemical, Nuclear* (Transnational Publishers, 2002), co-edited by Yonah Alexander and Milton Hoenig.

Some of the most focused publications on biological terrorism were initiated by PIPS and the IUCTS over two decades ago. A major book on *Countering Biological Terrorism in the U.S.: An Understanding of Issues and Status* co-edited by David W. Siegrist and Janice M. Graham was released by Oceana Publications, Inc. in 1999 as a special volume included in *Terrorism: Documents of International and Local Control* (edited by Yonah Alexander and Donald J. Musch).

Mention should be made of several other recent relevant publications. One is a report on “Reassessing the WMD Challenges: The Next Phase?” (May 2014) with the participation of Charles A. Duelfer (Former Special Advisor to the Director of Central Intelligence for Iraq, WMD; leader of the Iraq Survey Group on WMD; and acting Chairman of the UN Special Commission on Iraq (UNSCOM); Greg Gross (Former Deputy Assistant Secretary of Defense and senior staff member, U.S. Senate); Michael Eisenstadt (Senior Fellow and Director, Military and Security Studies Program, the Washington Institute for Near East Policy); and Dr. Milton Hoenig (physicist).²¹

The second publication is “Latin America’s Strategic Outlook: Populist Politics, Health Concerns, and Other Security Challenges” (April 2017) that focuses *inter alia* on biological terrorism. Among the contributors to this report are Professor Gary Simon (Director, Division of Infectious Diseases, Medical Faculty Associates, The George Washington University); Professor S. Gerald Sandler (Professor of Medicine and Pathology at Georgetown University Medical Center and Medical Director of the Blood Transfusion Service, MedStar Georgetown University Hospital); Dr. Asha M. George (Co-Director of the Blue Ribbon Study Panel on Biodefense); and Dr. Tara Kirk Sell (an associate at the Center for Health Security at the University of Pittsburgh Medical Center).²²

The third publication is a report on “Biological Terrorism: Past Lessons and Future Outlook” (June 2017) that includes a number of presentations delivered at past and recent seminars. The contributors include the Honorable Richard Danzig (Secretary of the Navy) and Professor Matthew Meselson (Harvard University) who participated in PIPS/IUCTS seminars in 1999 that focused on the threat of biological terrorism as well as Governor Thomas J. Ridge and Senator Joseph I. Lieberman who spoke at an event on “International Cooperation in Combating Terrorism: Review of 2015 and Outlook for 2016” held on February 8, 2016, at the National Press Club.

Additional contributors to this report include Professor Rita Colwell (Distinguished University Professor at the University of Maryland, College Park and the Johns Hopkins University Bloomberg School of Public Health, and Senior Fellow at Potomac Institute for Policy Studies) and The

Honorable Tevi Troy, PhD (CEO, American Health Policy Institute and Former Deputy Secretary, U.S. Department of Health and Human Services) who both participated at an event on “Preventing WMD Terrorism: Past Lessons and Future Outlook” held on March 23, 2017, at the Potomac Institute for Policy Studies.

The fourth publication is a report on “Preventing WMD Terrorism: Ten Perspectives” (August 2017). It draws from two other major academic sources. Presentations by Dr. Rita Colwell, Kyle Olson, and Dr. Richard Weitz were made at a seminar on “Preventing WMD terrorism: Past Lessons and Future Outlook” held on March 23, 2017 at the Potomac Institute for Policy Studies and were slightly edited for this publication.²³ The contributions from David Albright, Ambassador Bonnie D. Jenkins, Antony Fainberg, the Hon. Charles A. Duelfer, Michael Eisenstadt, Dr. Milton Hoenig, and the Hon. Guy Roberts were made at earlier events organized by the IUCTS with its affiliated institutions and published previously in our reports and journals.

The fifth publication is a report on “Combating Biological Terrorism: Roadmaps for Global Strategies” (January 2018). It consisted of four contributions made by Professor Rita Colwell, Professor S. Gerald Sandler, Dr. Norman Kahn (Consultant, Counter-Bio LLC; former Director, Intelligence Community Counter-Biological Weapons Program), and Dr. Anthony Fainberg (former official at the Federal Aviation Administration and the Transportation Security Administration and currently a scientific advisor to the IUCTS). This latest academic effort draws from a seminar on the same topic held at the Potomac Institute for Policy Studies on August 24, 2017 as well as continuing discussions with colleagues on the “Biological Terrorism: International Dimensions” project during 2017 and early 2018.²⁴

And the sixth report on “Two Decades of Combating Terrorism: Tactical and Strategic Lessons” (October 2018), published by PIPS and IUCTS, included relevant WMD and biological issues presented by Guy Roberts (Assistant Secretary of Defense for Nuclear, Chemical, and Biological Programs), and Professor Rita Colwell, at an event on “Combating Terrorism: National, Regional, and Global Lessons for the Next Decade and Beyond” held on April 30, 2018 at the National Press Club in Washington, D.C.²⁵

The current report on “Biological Terrorism: International Dimensions” (held on March 28, 2019 at the International Law Institute in Washington, D.C.) includes the following contributors: Dr. Larry Kerr (Director, Pandemics and Emerging Threats, Office of Global Affairs, U.S. Department of Health and Human Services); Professor Rita Colwell (Distinguished University Professor at the University of Maryland, College Park and Johns Hopkins University Bloomberg School of Public Health, and Senior Fellow, Potomac Institute for Policy Studies); Dr. Daniel M. Gerstein (Senior Policy Researcher at the Rand Corporation, and Former Acting Undersecretary and Deputy Undersecretary in the Science and Technology Directorate, Department of Homeland Security); Dr. Gerald L. Epstein (Distinguished Research Fellow at the Center for the Study of Weapons of Mass Destruction, National Defense University); and, Dr. Meghan Delaney (Chief of Pathology &

Laboratory Medicine and Medical Director for Transfusion Medicine, Children's National Medical Center, and Associate Professor of Pathology & Pediatrics, George Washington University).

Professor Yonah Alexander served as moderator of the event and closing remarks were made by General (Ret.) Al Gray (Twenty-Ninth Commandant of the U.S. Marine Corps, and Senior Fellow, Potomac Institute for Policy Studies).²⁶

They have each extraordinarily provided most insightful observations and recommendations on biological threat reduction programs and policies for U.S. and international bodies for the coming months and years.

III. ACKNOWLEDGEMENTS

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We are also grateful to Professor Don Wallace, Jr. (Chairman, International Law Institute); Professor John Norton Moore (Director of the Center for National Security Law and the Center for Oceans Law and Policy, University of Virginia School of Law); and Professor Robert F. Turner (Distinguished Fellow and Associate Director, Center for National Security Law, University of Virginia School of Law) for their inspiration and continuing support of our academic work in the field of global security concerns.

Finally, Jesse Berman, Research Associate & Coordinator at the IUCTS, deserves our thanks for his professionalism. He ably coordinated the research work of the Fall 2018 and Spring 2019 internship programs that included Dante Moreno (George Washington University), Ashley Rodriguez (University of California Berkeley), and Parker Fisher (Institute of World Politics).

ENDNOTES

1. This introduction is based on a knowledge-base developed by the author and his colleagues over the past half-century. Details on the research structures, methodologies, publications, and various relevant activities are provided in the "Academic Context" segment of this Introduction
2. This and subsequent sections on biological threats are drawn from selected published and unpublished studies authored and edited by Yonah Alexander. See, for instance, "Preventing WMD Terrorism: Ten Perspectives" (August 2017). It is detailed in the "Academic Context" section of this report.
3. Suzanne Austin Alchon, "A Pest in the Land: New World Epidemics in a Global Perspective," *University of New Mexico Press*, 2003.
4. "1918 Pandemic (H1N1 Virus)," *Center for Disease Control*, March 20, 2019.

5. "1957-1958 Pandemic (H2N2 Virus)," *Center for Disease Control*, January 2, 2019.
6. "Congo ebola outbreak death toll surpasses 1,000," *MedicalXpress*, May 7, 2019.
7. "Zika Virus Transmission Methods," *Center for Disease Control*, January 9, 2019.
8. Joe Lieberman and Tom Ridge, "Measles outbreak exposes future national public health vulnerabilities," *USA Today*, April 16, 2019.
9. Baron Antoine-Henri Jomini. *The Art of War*, translated by Capt. G. H. Mendell and Lt. W.P. Craighill. Philadelphia: J.B. Lippincott & Co., 1862, p. 48.
10. Cited in *Dictionary of Military and Naval Quotations*. Annapolis, MD: U.S. Naval Institute, 1966, p. 358.
11. Daniel R. Coats. "Worldwide Threat Assessment of the U.S. Intelligence Community." *U.S. Senate Select Committee on Intelligence*, February 13, 2018.
12. Patrick Tucker. "The Government's Bioterror-Response Website May Be Leaking Sensitive Data," *Defense One*, December 13, 2018. <https://www.defenseone.com/technology/2018/12/governments-bioterror-response-website-may-be-leaking-sensitive-data/153518/>
13. "Wisconsin woman pleads guilty to terrorism charges," *The Washington Post*, April 22, 2019. https://www.washingtonpost.com/national/wisconsin-woman-pleads-guilty-to-terrorism-charges/2019/04/22/48c23084-6531-11e9-a698-2a8f808c9cfb_story.html?utm_term=.3266e7b70b56
14. "Venezuela crisis could spark surge in infectious diseases: study," *Reuters*, February 21, 2019. <https://www.reuters.com/article/us-health-venezuela-diseases/venezuela-crisis-could-spark-surge-in-infectious-diseases-study-idUSKCN1QA2ZN>
15. Julian Ryall, "North Korea's bio weapons 'more of a threat than nuclear arsenal,'" *The Telegraph*, January 18, 2019. See, also, Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung's "North Korea's Biological Weapons Program: The Known and Unknown" report published by Harvard Kennedy School, Belfer Center for Science and International Affairs.
16. "Russia and UK to present joint document on emergency response to use of biological weapons," *TASS*, December 6, 2018. <http://tass.com/world/1034553>
17. "Pakistan issues export control list of goods, technologies related to nuclear, biological weapons," *The Economic Times*, December 20, 2018. <https://economictimes.indiatimes.com/news/defence/pakistan-issues-export-control-list-of-goods-technologies-related-to-nuclear-biological-weapons/articleshow/67178354.cms>
18. "Taiwan to upgrade lab for biological warfare defense," *Asia Times*, January 8, 2019. <http://www.atimes.com/article/taiwan-to-upgrade-lab-for-biological-warfare-defense/>
19. "Regional biological weapons convention workshop held in Fiji," *Xinhua Net*, December 12, 2018. http://www.xinhuanet.com/english/2018-12/12/c_137668568.htm
20. Avi Selk. "Bill Gates: Bioterrorism could kill more than nuclear war—but no one is ready to deal with it." *The Washington Post*, February 18, 2017.
21. This report was based upon a Special Seminar on "Reassessing the WMD Challenges: The Next Phase?" held on October 30, 2013 at the International Law Institute in Washington, D.C. The video of this seminar can be found at <https://www.iucts.org/seminars/10-30-2013-reassessing-the-wmd-challenges-the-next-phase/>.
22. This report was based upon a Special Seminar on "Latin American Security Challenges: From the Olympics to Zika" held on June 23, 2016 at the International Law Institute in Washington, D.C., as well as a Special Seminar on "Latin America's Security Outlook: Challenges and Opportunities in the Post-Castro Era" held on December 16, 2016 at the Potomac Institute for Policy Studies in Arlington, VA. The videos of these seminars can be found at <https://www.iucts.org/seminars/06-23-16-latin-american-security-challenges/> and <https://www.iucts.org/seminars/12-16-16-latin-america-s-security-outlook/>, respectively.
23. A video of this seminar can be found at <https://www.iucts.org/seminars/03-23-17-preventing-wmd-terrorism-past-lessons-and-future-outlook/>.
24. A video of this seminar can be found at <https://www.iucts.org/seminars/08-24-17-combating-biological-terrorism/>.
25. A video of this seminar can be found at <https://www.iucts.org/seminars/04-30-18-combating-terrorism-lessons-next-decade-and-beyond/>.
26. A video of this seminar can be found at <https://www.iucts.org/seminars/3-28-19-biological-terrorism-international-dimensions/>.

CONTRIBUTIONS

Dr. Larry Kerr

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Question: Is the international community prepared to identify, prevent, counter, and respond to future biological threats, either by mother nature or man-made?

Response: No nation on the face of this earth is actually prepared.

Think about the 2014/2015 West Ebola outbreak. Think about in 2015 when MERS reached a major urban city in the Republic of Korea. Remember in 2018 the ongoing epidemic in the DRC. Unprecedented security situations are absolutely impeding the public health response. If our predictions are right, this epidemic will not be over before even March 2020 of next year, and could possibly surpass the Ebola epidemic of West Africa, where 28,000 people were infected and 11,000 died. Or, think about the ongoing outbreak of Lassa in Nigeria.

Read a list of countries: Australia, Brazil, British Columbia, Canada, Columbia, England, Ethiopia, Georgia, Greece, Honduras, Italy, Israel, Kazakhstan, Madagascar, Mexico, Philippines, South Korea, Thailand, Ukraine, Vietnam, Venezuela, and the United States. What do they all have in common? They all have Measles outbreak at epidemic levels. A completely, 100%, vaccine-preventable disease again at epidemic proportions around the world. Three states in the U.S. have declared public health emergencies. Think about it. We have what is inarguably the safest and most efficacious vaccine—to date, our best guess would be, over 15 billion people have been vaccinated with the MMR since 1968 when it was licensed. And yet we are still having outbreaks. In 2000, we eliminated measles in the United States. And here we are with three states declaring public health emergencies.

And finally, I mention pandemic influenza, one of the portfolios my team works on. I have to remind people this is the infectious disease we deem the highest threat to cause a pandemic around the world of the greatest severity. There are nine influenza strains right now we are following very closely that have already been deemed of “pandemic potential”. You’ve probably heard of H5N1 that still maintains around a 60% fatality rate, or H7N9 in China that maintains around a 40% fatality rate, and several others that on the scale would place as just a great a threat to our security should they acquire sustained human-to-human transmission.

I think it’s important to recognize these outbreaks, but also to take into account that out of these adverse conditions we must recognize the lessons learned, the resilience that comes from them, the planning efforts, and take those forwards into our current efforts. I would actually like to talk about

three major themes when it comes to thinking about how we prepare for both naturally occurring as well as intentional biological incidents:

Preparedness planning is critical. We do something exceptionally well in the United States and that is as an inter-agency—meaning all our departments and agencies—we plan, we talk, we fight. But we come to recognize that within biological incident preparedness planning, every single department of the U.S. government—every part of our state, federal, territorial, and local governments—private sector, academia, foundations, NGOs—have a part to play.

An example I often share with international partners is that every single Wednesday we sit at the White House reporting on what we are doing on influenza. Has anyone heard about the anti-viral shortages in the United States? Has anyone read about the vaccine shortages? It's a trick question. In the past two years, you probably haven't, and that's because of things that go on behind the scenes. In any given part of the state, if there's a recognition that they're going from what we call green to yellow—an increase in influenza-like illness is occurring—federally we work with our partners and can ship antivirals to places that are going to become red zones before it happens. We're able to ship when a county or local health department is saying they are going low on vaccines. So, in the past two years, that actually hasn't happened. That doesn't occur in any other place else in the world. It's a capability we have only acquired out of the lessons of the 2009/2010 pandemic influenza which, fortunately, was not as severe. We might not be so lucky with the next one. But it's those types of preparedness activities that involve literally all of the partners—from Health and Human Services, to Transportation, to Commerce—that must work together to make something like that happen. And we use seasonal influenza preparedness, or last year what we would call seasonal influenza “epidemic,” because of the sheer number of hospitalizations and fatalities that occur, to be prepared for the next big one.

A shift in the dialogue is occurring globally, and that is that “Ministers of Health are used to talking to Ministers of Health.” In some places they're good about talking to Ministers of Agriculture. So you start to bring in more of the one health dialogue. Sometimes they talk to Ministers of the Environment, probably not as much as we would hope. But the dialogues are increasing. What we're finding is when a Minister of Health talks to a Minister of Finance, who holds the purse strings, you're actually talking about capacity building and building a workforce that is able to staff laboratories that are able to diagnose your disease. We're able to have surveillance systems that are able to notify not only larger parts of the country, but surrounding countries and ultimately the World Health Organization.

All of that requires sustained money, not just one-time infusion of money. The problem that we find is that Ministers of Health speak a very different language than a Minister of Finance. So, how does quoting statistics on the number of hospitalizations and the number of deaths that may occur, or if there is to be a potential biological incident of mass-casualty—how do you convince the

Minister of Finance of something that may happen weeks, years, possibly even never? Remember, if preparedness planning does its job well enough, you may actually prevent something from becoming a mass-casualty. But Ministers of Finance think in terms of return on investment, sometimes in an annual way, and it's very difficult to build that argument. And so, what we're finding is that a lot of times we are going back to the real fundamentals of education, having the Minister of Health's people sit with the Minister of Finance and walk in their shoes for sometime. Have the Minister of Finance sit in the Minister of Agriculture's job for a while and understand what they are going through. Build the common vocabulary that allows them to put forward budgets that are in the right language to convince that Minister of Finance to allocate and appropriate money towards preparedness planning.

Former World Bank President Jim Kim had a really great statement in one of his big speeches in Davos where he said that "for every million dollars spent in prevention or preparedness, you're going to save ten million dollars in response, and one hundred million dollars in recovery." That argument now has come a very long way. So you are finding this dialogue between health, agriculture, commerce, and finance taking on a much more robust dialogue. And we are seeing the impact in terms of dollars actually being invested in preparedness planning.

Similar to the first theme, when you are in a response, people are going to find that it's multi-sectoral. You've all heard the adage that when something happens, and you're in the middle of the crisis, it's not when you want to be exchanging business cards. That is so very true. If the planning has taken part among all of the partners, if they know one another, those are the types of relationships that during a response are so very critical. So as part of planning, we always advocate for testing an exercise so the people get to know one another. And it's so very critical that not only our government, but in governments where leadership changes over and new people come in where those relationships may not have existed previously and have to be re-established every time. But ultimately they pay off in the long run and help in the response and recovery.

Professor Rita R. Colwell

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College Park and Johns Hopkins University Bloomberg School of Public
Health, and Senior Fellow, Potomac Institute for Policy Studies*

Threats of bioterrorism are still with us. In 2001, at the time of the catastrophe of the Twin Towers, an anthrax episode occurred. I was Director of the National Science Foundation and, with Dr. Tony Fauci, concluded that the perpetrator was best pursued employing genomics.

The anthrax attack was eighteen years ago, at the time when genomics science was in an early stage of development and relatively few nucleic acid sequences were available, e. g., with only a partial sequence of the anthrax bacterium in the public domain. Over the next six years, a team comprising representatives across the federal agencies, including NSF, NIH, FDA, DoD, USDA, DHS, and other agencies, was assembled. The meetings were held weekly and were both closed and classified.

The meetings were held each Friday afternoon for three years and monthly for the next three years, with representatives of the FBI and CIA included in the research team that called itself the National Inter-Agency Genome Sciences Coordinating Committee (NIGSCC). The meetings were informal and work was done by this very effective team to organize the collection of strains of anthrax and potential biothreat agents, namely pathogens. The conclusion drawn by NIGSCC was that genome evidence pointed to a microbial culture at Fort Detrick, Maryland, carrying mutations of the anthrax strain that had been sent to victims. Unfortunately, we will never know all the details of the actual events because on the day he was to be arrested by the FBI, Dr. Bruce Ivins committed suicide, a tragedy on all counts.

Today genomic sciences have advanced significantly. Now we have a very powerful tool that we hadn't considered possible in 2001 and many organizations, researchers, and medical institutions are using DNA sequencing as a diagnostic tool. Some call it precision medicine because of the ability to sequence genomes of humans and detect genes that presage potential diseases. Ancestral relationships are gleaned by organizations like 23 and Me. Elaborate informatics allow detection and identification of pathogenic agents within hours, eventually within minutes, as the genomic sciences expand and evolve.

The technique my team and I have developed over the years involves extracting DNA from samples (food, water, blood, cerebrospinal fluid, gut samples, etc.), gut microbiota being currently of especially great interest. DNA fragments from sequencing are matched to a very extensive database containing more than 160,000 highly curated genomes, allowing identification of all microorganisms: bacteria, viruses, fungi, and protists. Further the isolates are characterized by their genes, such as those coding for pathogenic, metabolic, and antibiotic resistance traits. It is a very powerful tool allowing characterization of microorganisms and can be used effectively in forensics.

We are able to utilize the highly curated database to identify, not by names or taxonomy, by creating phylogenetic trees, i.e., evolutionary trees, to identify microorganisms—it is highly precise and makes it possible to identify all of a microbial population by separating human, animal, and plant DNA, and analyzing the portion representing microbial DNA very accurately. We are currently using machine learning/artificial intelligence to correlate incidence and patterns of the microbial population diversity with symptomatology. This allows employing diagnostics accurately and in ways not possible in the past.

With “big data” analyses, it is possible to correlate medical symptomology and conditions with the actual microbiome, those microorganisms inhabiting the human body. Thus, the methodology has become a very comprehensive tool and was developed by teams comprised of crypto-mathematicians, electrical engineers, computer scientists, and microbiologists. The analytic tools have very powerful and important application and have been tested against a variety of available algorithms, but our system allows identification to strain and sub-strain. Thus, it is possible to monitor and track a specific isolate associated with a given outbreak with highest accuracy. There are challenges that remain, however, but the tools developed by the many computer scientists working with biologists, have proven to be far superior to traditional forensic methods.

The microbiome of the human gut comprises 90-98% bacteria, viruses, fungi, and protists, species of which are specific to the gut, saliva, skin, tissues, and organs of the human body. In the gut, for example, they are protective (non-pathogenic coliforms, for example, some strains of which produce vitamins). However, it has been determined, that a variety of human illnesses, from neurological diseases to autoimmune diseases, and especially diabetes and obesity are influenced by the microbiome. Gut microbiome data for ten countries have been analyzed (Figure 1). Separated country by country (Figure 2), specific patterns are noted, likely reflective of diet and cultural habits having influence on the gut microbiome. Thus, the microbiome offers a potential bioinformatic tool, very useful for bioforensics. An individual arriving into a country covertly could claim he or she had resided in the U.S. for their entire life, but analysis of the gut flora will show, instead, from another country. The gut flora can change if the individual spends a long time in a new country, that is, can reflect a pattern of the new resident country according to local diet, etc.

Yet, there is a consistent pattern of microorganisms associated with specific regions of the world. Here, then, is a powerful tool useful diagnostically for medicine to track various diseases and conditions, but also to detect countries of origin.

Metagenomics offers forensics many very powerful and occasionally subtle tool. The methodology is being used successfully to understand diseases of the human body, including cancer and heart conditions. It provides a fascinating descriptor for the human body through the resident microorganism component and a powerful diagnostic for public health.

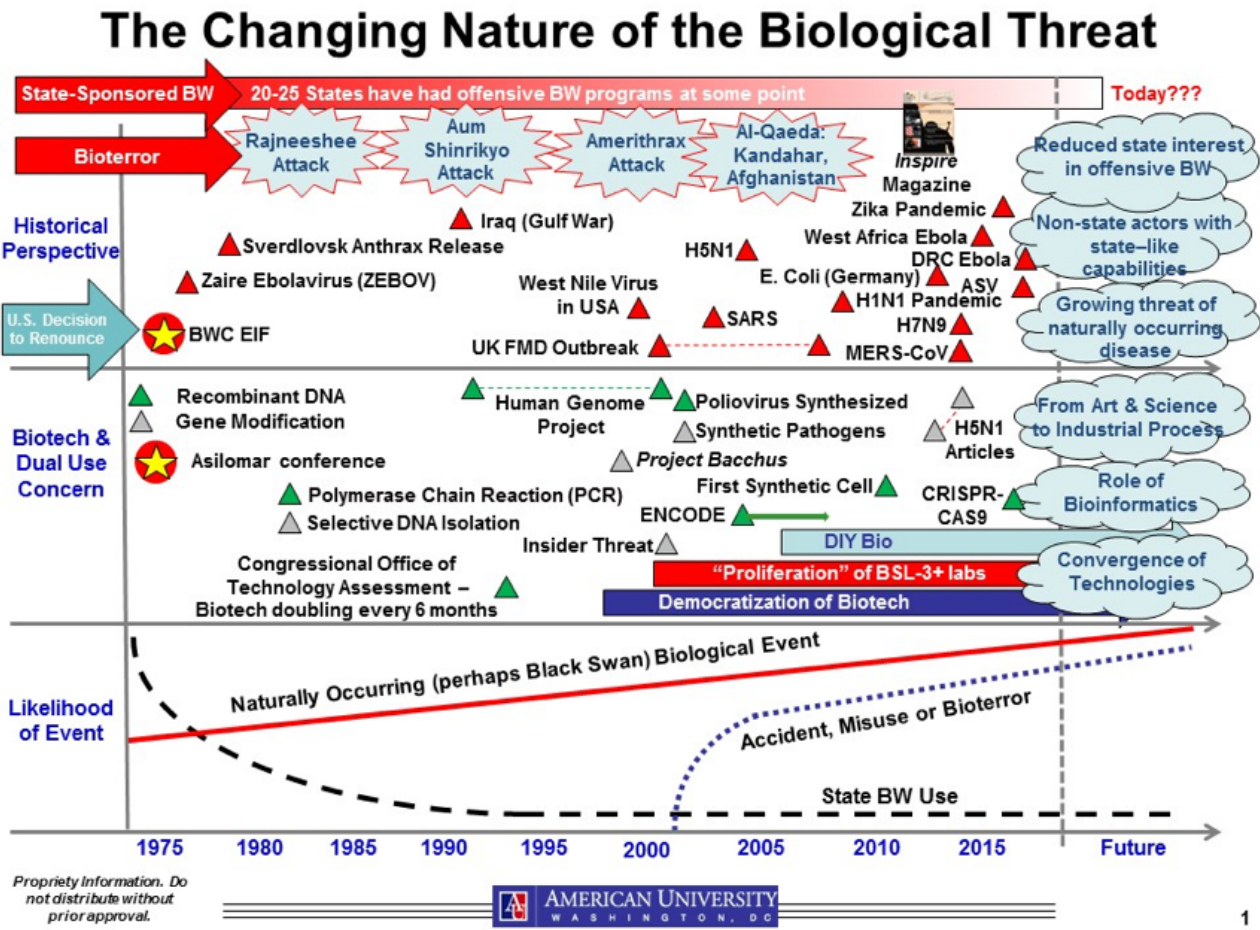
This is the world we inhabit twenty years after 9/11. Attention should be paid to the bioforensic and bioterrorism potential of metagenomics. The ability to use such powerful tools for genetically modifying organisms should also be discussed but it is a complex subject more appropriately addressed in a separate lecture. Nevertheless, it can be said that with these new microbiological/informatic tools it is possible to detect genomes that have been modified and inserted into other microorganisms.

We now have the capacity to track and monitor microorganisms in an exquisitely accurate way that we would not have been able to do twenty years ago. The key message for us in this meeting is that significant advances have been made in the genome sciences and we should incorporate the tools to gain understanding and determine appropriate applications to prevent bioterrorism actions.

Dr. Daniel M. Gerstein

Senior Policy Researcher at the Rand Corporation, and Former Acting Undersecretary and Deputy Undersecretary in the Science and Technology Directorate, Department of Homeland Security (2011-2014)

All the remarks today are my own and not necessarily derivative of RAND research. Having said that, I am working on a very interesting series of studies, which I hope we can discuss as part of the discussion today. I've had the opportunity to hear and interview some of the state and locals as well as some of our federal organizations about indications and warnings. So, I think it will be an interesting dialogue. Another thing is my remarks are very much derivative from where I work, which is in the security and defense arena, largely thinking about countering biological weapons. It doesn't mean I don't care about naturally-infectious disease. I care greatly about that as well.



I would like to use this chart to give you an overview of the threats and risks in the biological space. If you go to the very top of the chart, you'll see a line up there that talks about State-Sponsored Biological Warfare. In broad strokes without going into any classified information, just sort of historically-based, what we see is that over the course of history some 20-25 nations have had some type of biological program. And that's very difficult to get your arms around, because some of them, such as the Soviet Union and United States, actually had large stockpiles, whereas others may have just been in the discovery phase, doing research and development, or perhaps doing a bit of stockpiling of the pathogens, but not weaponization, which is marrying up the pathogen with a delivery means. But today when we look at the state of play, we see a very different outcome. And again no classified material here, but just in rough terms, we're talking some five or so states that we have questions about what their activities are.

If you go to the next line on this chart, I'm going to talk a little bit about bioterrorism. There have been some hundred or so bioterror incidents since about 1900. Those are approximate numbers. But when you peel those back, and look at them more closely, most of them are not particularly well-organized or executed. And most didn't have a very significant effect. Today when people talk about bioterrorism, they like to discuss the four events that I have listed up here. Most people talk about the Rajneeshees, they talk about Aum Shinrikyo—the failed Aum Shinrikyo attempt I should say,—they talk about Amerithrax, and they talk about what we found in places like Afghanistan when our Special Ops forces went in post-9/11.

They also like to point to things such as Inspire Magazine, which called on like-minded biologist and chemical trained terrorists to come together and create a jihad using these sorts of weapons. Now you can look at this and get the wrong impression if you're not very careful. Because most people fixate on the Amerithrax and they say, 'well wait, wasn't that the incident where we had a lot of people exposed—many of which were placed on high-strength antibiotics, 22 people sickened, and 5 killed? Well that's not that big a problem.' And then you sort of have to back them up and you have to remind them of the broader history of biological weapons beginning with the Japanese in the 1920s, Russians in the 1930s and the United States in the 1940s. Through these programs, we learned a great deal about the potential of these weapons.

So going farther down this chart, the historical perspective is this: we've had since 1975—when the BWC (Biological Weapons Convention) entered into force—a rich history of the growth of emerging infectious disease around the world. We've witnessed outbreaks which have been very catastrophic, many of which did not make the news here in the United States. Like UK's Foot and Mouth Disease (FMD) which was tragic, not only for the livestock industry, but also because they had 60 suicides as a result of destroyed lives. You look at some pandemics and outbreaks including the Zika pandemics and the two recent Ebola in West Africa and the Congo, the current one that's on-going. You can look at African Swine Fever (ASF) which is coming across the continent of

Europe and will soon be in the Western part of Europe in great numbers. It is likely we will be very concerned about it coming to our shores as well.

Go down to the second area and you see Biotech and Dual Use Concern. I will not go through this in great detail. But what I want to leave you with is that since the 1975 Asilomar conference, which looked at synthetic biology and DNA engineering, we've seen a real rush across to the right side of chart where we've seen greater capabilities. These biotechnologies are rapidly proliferating across the globe.

Then go to the very bottom of the chart to the Likelihood of Events. These are my assessments. I assess that the likelihood of State BW use to be going down; with likelihood of an accident, misuse or bioterror going up; and then the Naturally Occurring (perhaps Black Swan) Biological Event is going up as well. Furthermore what we're seeing overall is that the capabilities available for someone who wants to make use of them have gone from the art and science to really industrial processes. And I think that's really important to understand.

So why did I take you through this chart? Let me walk you back to the old offensive program that the U.S. had in the 1940's, 50's, and 60's. We learned a great deal about biological weapons during this period. Some of it we're now going back to re-learn because many of those lessons had been put-off to the side, had essentially been forgotten. But the first thing I'll tell you is that biological weapons are strategic weapons. They have nuclear equivalence. If they are properly prepared, they can be equally devastating to populations. We also see that the growing availability of biotechnology and knowledge to use the capabilities has proliferated so rapidly that we could in fact see a bioterrorist do what we had only thought states could do say a couple decades ago, maybe even a decade ago.

When we look at the types of disease that could occur through a properly prepared biological weapon, a couple things come to mind. First, the forms of the disease would not mimic naturally occurring disease. So therefore, when you ask somebody 'Tularemia, what's the incubation,' and they say 'it's 2-21 days; well, that's true if it's a naturally occurring. But if it is something that has been weaponized and deployed in an aerosol, you could actually have symptoms occur in hours. Furthermore, some of those exposed in the primary aerosol—those receiving an overwhelming dose--would not be responsive to antibiotics. Even supportive care would do very little for those who received an overwhelming dose.

So at the same time we're thinking about this potential, it's important to understand that the toxin programs that were part of the history have also not gone away. And people, including states, are thinking about how one could use toxins in a way such as to cause a disease death. In fact, toxins would act similarly to chemical weapons with symptom onset very rapidly.

The second major point I want to talk about is the Biological Weapons Convention. During my service in the Department of Defense, responsibility for monitoring the BWC for DoD was under me. Here are a couple of things that are worthy of note. First, the BWC has a lot of flaws. On the other hand, it has served as the definitive, unequivocal norm that many of us believe is the reason why we have not seen a large-scale biological attack. It has simply made it clearly against the norms of human behavior to have conduct a BW attack. But having said that, when I look at norms in WMD, I think about chemicals in Syria, I think about binary nerve agent used by North Korea in an assassination, I think about Russia Novichok chemical weapons, I think about polonium 210 being used as a radiological weapon. All of the dialogue between world leaders seems to me to be dangerously lowering thresholds, perhaps even increasing the possibility of the use of WMD, perhaps even BW. And when I think about the general state of arms control between U.S. and Russia, and across the globe, I have cause for great concern.

So I think we need to think about the BWC. And I don't want to spend too much time on it. But I will say that I think it needs to be updated for the 21st century. We need to think about what we really want out of this convention. The U.S. has not been a particularly productive player, and we need to perhaps think about different ways of approaching this issue. In one particular paper, a gentleman from Georgetown University Medical School—Dr. James Giordano—and I suggest that we need to think about including in the BWC things such as immunomodulators and neuro-modulators and artificial biotechnology, which could be very useful in attacking humans in ways that would change their biological processes.

The third area is international collaboration, which is really the cornerstone for biodefense. And there are really two sides to biodefense, preparedness and response. In preparedness, there are certain things that we are doing fairly well. However, in response, I'd say we have quite a way to go. In preparedness, the disease surveillance, the global work that we're doing--such as the Global Health Security Agenda (GHSA) through the Cooperative Threat Reduction Program that's run cooperatively by the Departments of Defense and State—have been very powerful in helping to take certain of these eliminate and secure some of the dangerous pathogen repositories. We've helped build labs in countries and educate scientists. Some of that has been very good. However, when one looks at what's going on with respect to some of these issues, I was pretty surprised that the Trump administration had decided to reduce funding in 39 of 49 countries in terms of bio-surveillance. I don't think that bodes well for the future because what we're trying to do is build an international capacity. These funds are critical for biosurveillance.

In terms of our response capacity, I would say we are not prepared for a significant biological threat. One only need look at the Zika and Ebola response here in this country; the different discussions we have with respect to even seasonal influenza in which confusing guidance and incorrect information has been given to the public; and the recent measles outbreak. All of this says we are simply not prepared. In addition to biosurveillance, we need to have point-of-care diagnostics, environmental sensors, modern IT and big data tools, and the rapid dissemination of information

and bioinformatics. Thinking about some of the shortfalls, it wasn't too long ago that the Trump administration looked to get rid of the NBACC, a facility that was built specifically after 9/11 Amerithrax, to be able to do threat assessments and bioforensics. It's both pretty interesting and shortsighted when you look at some of what's gone on in funding.

My fourth issue, and I'll say this very quickly, is there have been a number of indications here in this country that there's much work to do. The Blue Ribbon Panel on Bio Defense talked about putting someone in charge who could really be in charge. They recommended the Vice President because it requires coordinating across our interagency. And so far, the administration has not picked up on that. This is not just being critical of the Trump administration; the Obama administration also did not have anyone particularly in charge of the biodefense mission space.

I would also say in looking at the National Biodefense Strategy that's just been released, I have some concerns. It reads like a list of objectives or ends. From a military perspective, I rate it as having lots of ends but no ways and means. In other words, the strategy does not deal directly with the most important issue, implementation. It has no resources to follow, little detail on how the strategy is to be accomplished, and therefore it is unlikely to be successful. I would also say that in some of what is in the biodefense strategy, requires greater funding for basic research in the life sciences. Yet, as we just saw, the Trump administration has called for a 20% reduction in the budget for basic research, which again doesn't bode well.

I would conclude by saying that I see some peaks of light coming out. It's good that there's a strategy. The international collaboration has been much improved over the past 20 years. Yet, there's a long way to go for us to be prepared for a major biological attack.

Dr. Jerry Epstein*

Distinguished Research Fellow at the Center for the Study of Weapons of Mass Destruction, National Defense University

I want to talk about the typical United States reaction to being asked to talk about international perspectives, which is, “let me tell you about the United States.” But I really do think this is a relevant approach. Dr. Gerstein did mention the National Bio Defense Strategy that was issued last year. I’ll talk a little bit about how that strategy is thoroughly interweaved with international recognition and touchpoints. As Dan pointed out, though, implementing all the goals and objectives of the strategy is going to depend on the overall funding environment and the immediacy of purely domestic needs. When there’s a choice between building an international capability, which we recognize as important, and doing something more urgent or more immediate domestically, there’s always going to be a tension for resources there. The National Bio Defense Strategy is fully consistent with and gives impetus to the prior Global Health Security Agenda. Which, again, is a recognition that even if one is solely interested in protecting the United States, one has to reach out globally to do that. And not that that is our only goal, but one can’t protect the United States without having a foreign presence.

I’m going to talk a little bit about what I see is the world community’s approach towards the deliberate threat, which I think has undergone a fair amount of flux. But I think views are converging to a recognition that this is a significant problem. However, prioritizing against the deliberate threat is always going to be difficult in the face of ongoing, immediate natural disease outbreaks, and of differing perspectives among countries of the world about what the real likelihood or immediacy of the deliberate threat is. So there is some recognition of the deliberate threat as being significant, and not necessarily something that should be subordinated to natural threats. There’s always going to be continuing dialogues and tensions. And whenever one gets in an arena where there are public health equities fighting natural disease, and security equities who are fighting adversaries, there’s a very different mind-set and way those two sectors operate. These tensions have to be mediated; they will never be completely resolved. They have to be mediated largely through a process like Dr. Kerr described, where each ministry, each actor has to understand what the other ministry’s objectives are. All of them have to be able to satisfy all of their needs without stepping on each other’s toes and getting in each other’s ways.

And we’ve also talked about the difference between preparedness—getting ready for things, planning, advance communications—and what happens in an actual response. Any actual incident will

* Some edits have been made for clarity. All views expressed here are the sole responsibility of the speaker and do not necessarily represent views of the National Defense University or the Department of Defense.

severely tax any amount of advance planning. I think the speakers before me have said that we're going to have a hard time in a major outbreak no matter how much we plan, no matter how much we budget. So, there's always going to be that disconnect. But an actual outbreak does one thing for you. It focuses everybody's attention on something that might have been abstract, and might have been seen as off in the future, and might not have been seen as very significant when compared to the press of current events. In an outbreak, that IS your current event. And you will get the attention of decisionmakers, you will get the connections made between people who wouldn't otherwise have any reason to talk to each other, because that's going to be what everyone is talking about. So yes, it'll be a challenge to get your advance planning implemented in the case of a real world event. But the real world also focuses everyone's attention in a way that helps overcome some of the barriers that maybe have been too hard to handle in the abstract.

Let me talk a little bit about the National Bio Defense Strategy, I call it a three-dimensionally comprehensive strategy. It's comprehensive with respect to an incident's origins—it covers natural outbreaks, it covers accidental outbreaks, and it covers deliberate incidents, whether caused by terrorists or nation-states. It's comprehensive with respect to an incident's target—it covers attacks against humans, attacks against animals and plants and agriculture, and there are even some references to the environment. And it's comprehensive in a dimension that may be the most significant to mention in this meeting, which is with respect to an incident's location. It addresses domestic incidents and it also addresses incidents elsewhere in the world. The international implications, as I said, are completely "baked in." And here's a little example. I don't usually like to do this—I'd rather people read words than count them—but if you count the word "international" in the Biodefense strategy, you'll find it 82 times. You'll find 4 more 'foreign's, and 18 'global's or 'globalization's. And again, these are imbedded throughout the strategy. There are not separate sections where we say, 'here's what we'll do domestically' and then there's an overseas part. It's completely integrated throughout. Bottom line—the Strategy recognizes that "while the desired outcomes at home and abroad are the same, the conditions and avenues available to achieve these outcomes can be very different." And this is really important. Any country will pay more weight to the health and welfare of its own citizens than to the rest of the world. It can't not do that. It's own citizens are any country's primary responsibility. But any country has to recognize that health and disease control anywhere in the world can affect it's own citizens. So, in order to do it's domestic job, it has to have an outward looking foreign presence. But no country is going to pay as much attention to the rest of the world as it does to its own citizens, so there'll always be differences in how these strategies are applied and implemented domestically as compared to internationally, even though the bottom-line goals and objectives and outcomes are the same.

If you ask what are the international dimensions of the National Biodefense Strategy, I'd say it means at least four different things with respect to bioterrorism, even considering an event that ends up having direct effects only within the United States. First, we have to recognize that the

science and technology base, the industrial base, and the supply chains that underlie anyone's ability to produce a biological incident are thoroughly global. So, one can't wall off any one country and pretend that this technology doesn't exist elsewhere. And much of the technology one would need to conduct a biological attack is impossible to control. It's not centralized, it's not nation-state directed, it has low-barriers for entry, and for public health reasons this technology has to be available to everybody. So, the technology base that can be exploited to produce a biological attack is thoroughly global. As a second point, a domestic attack can be conducted by a group that is based overseas. So, one's prevention and protection efforts have to have some ability to reach internationally. Thirdly, even an overseas attack can have domestic consequences. People move around the world, as do infected or contaminated goods, so a disease outbreak anywhere in the world can never be assured to remain wholly outside the United States. One has to always anticipate that an overseas event can end up being a domestic event. We saw that to some extent with the West African Ebola outbreak in 2014. Fourth, even overseas disease outbreaks that never reach the United States can have indirect domestic consequences through disruptions to travel and shipping and trade. And so, for all these reasons, international aspects of biological incidents, whether deliberate or natural, are inevitably and inherently connected to what we do here. And if there are attacks overseas that erode the norms we've heard about earlier in this session against biological weapons, that norm erosion can have ramifications later on for things that might happen purely domestically. So, in all these different aspects, international dimensions are critical to consider.

We've heard some in previous talks about the Biological Weapons Convention. One consequence of having a Biological Weapons Convention is that all countries in the world can be on the same side. That's more difficult for a weapons system like nuclear weapons. The United States has nuclear weapons, and under the Nuclear Nonproliferation treaty the United States and four other countries are acknowledged as nuclear weapons states. Every other State Party to that treaty cannot have nuclear weapons. And it gets delicate in trying to explain that we in the United States have the ultimate objective of getting rid of all our nuclear weapons, but until the times are propitious for reaching ultimate end state, we have to maintain a robust and secure nuclear stockpile. This is essentially saying that we have it, but you can't have it. Take other arenas such as cyberspace, electronic warfare, and conventional Ammunitions. These are all areas where countries say, "we need to have the best weapons, but we'd prefer that you not have any." And that's not a sustainable outcome. And it's hard for all countries to be on the same side when addressing the implications of where these technologies can go. But in the case of the Biological Weapons Convention, all countries, at least all that have signed up to this treaty, can be on the same side. Any biological attack anywhere threatens this norm and threatens all of us. So, the prospects for cooperation can be greater in this arena than in one where we're trying to carve out 'well we can do this, but we don't want you to.'

Let me now talk a little bit about some of the ways in which international aspects are addressed in specific parts of the National Biodefense Strategy. The Strategy articulates five goals. Goal one is information awareness and biosurveillance. That's inherently an international problem. One has to

look for disease wherever it occurs. Goal two is prevention. I mentioned the importance of doing what one can to prevent groups anywhere in the world from amassing capabilities to enact biological attacks, and of disrupting efforts where we are aware of them. The Strategy also talks about preventing the spread of disease at its source. This is what motivates us to mitigate outbreaks overseas to the greatest extent we can. The Strategy talks about strengthening global health security capacity, because countries all around the world need to have the ability to fight disease at home so it won't spread and become an international incident. And in terms of the deliberate threat, the strategy talks about "detering, detecting, degrading, denying, or otherwise preventing" the capability for conducting deliberate incidents. Recognizing the global spread of technology, in ways that I've said are very hard to counter and in many ways one would not want to counter, this is nevertheless a goal. It can be very difficult to achieve that, but you want to address this when possible. Goal three we've heard a lot about earlier in this session—preparedness. The strategy talks about strengthening international preparedness to support response and recovery activities. Goal four is an actual response. And it talks about United States efforts to support international incident response that will be coordinated through the State Department. And it also says the United States shall support international investigations. Let me now say a little bit more about that.

When one has a deliberate incident of disease anywhere around the world, it's important to the international community, and it's certainly important to the United States, to find out who did it, who is responsible. Firstly, to make sure they're not going to keep doing it. And secondly, to make sure that there's some accountability; to try and reinforce that norm so future attackers know that it didn't go well the first time and they should beware of trying to do it again. The need to point fingers at culprits can introduce tensions in terms of the international cooperation which is normally seen in fighting natural disease. Where the enemy is nature and we aren't suspecting certain parties of having conducted a deliberate attack, cooperation on the response is much easier. But countries may be less willing to cooperate in an investigation if they think they may be suspected of being responsible. Goal five is recovery. The strategy talks about reducing the cascading effects of international incidents, which I have already mentioned a bit about: Trade disruption. Travel disruption. Personnel Movement.

Now I'll say a little bit about international perspectives on bioterrorism. Before 9/11 and in the time period shortly after 9/11, I think U.S. views on the immediacy and importance of the bioterrorist threat were quite at odds with a lot of the rest of the global community. At one point I was talking to a senior U.S. decisionmaker, and I asked, "is bioterrorism just a U.S. obsession?" There seemed to be a lot of discussion and worry here in the United States about bioterrorism, but that didn't seem to be shared elsewhere in the world. His answer was, "a U.S. obsession? I wish it were a U.S. obsession"—meaning that the United States defense budget devotes many of orders of magnitude less funding to biological threats than it does to other threats that could have equivalent effects. Biology wasn't seen as significant as other security issues, even here. But the United States had much more pointed awareness of the threat of bioterrorism than many others around the world. The dialogue was a little rocky at first. I think it's been strongly converging since then.

Even in the United States, our own perspectives have evolved. The H5N1 avian influenza outbreaks we saw in the early 2000s, and the risk that that disease might explode into a human pandemic, kind of supplanted 9/11 in driving a lot of U.S. policy. We didn't drop the deliberate problem, but we remembered the natural problem was still there. At the same time, greater saliency abroad was given to deliberate risks.

India might be a case in point. For a long time in discussions about the deliberate use of biology as a weapon, Indian officials would say, "have you looked at our health problem? We have a massive, ongoing natural disease problem. We can't be bothered with these hypothetical things you all are telling us about. We've got far too many people dying of preventable disease all the time." By 2008, when I was visiting India for a project on biological threat reduction, I talked to people in the Indian Ministry of Defense who were quite seized with the issue of a deliberate attack. So by then, even in a country with a massive natural disease burden, government officials in the security sector were saying that we do need to pay attention to deliberate threats as well.

The World Health Organization (WHO) has become much more engaged. It has to preserve its perceived political neutrality so that its officials can gain access to any country in the world where their expertise may be needed to help keep a disease outbreak from spreading. It is very concerned that if it were perceived as having an investigatory or security role in determining who might be responsible for a biological attack, it would lose its perceived objectivity and access. Even so, there is some work going on at the WHO in terms of preparing guidance that might be used for responding to deliberate epidemics. The WHO has been a forum for global communication about dual use research of concern, where advances in science and technology can create capabilities that others can misuse for harm. WHO has convened, granted with external funding, but it has been a useful convener to bring countries together on this topic. So, it is very aware that a disease outbreak can be caused by a deliberate attack. It is something that the WHO will have to worry about. And it still has to manage its relationships and political accesses. It still doesn't want to be ultimately in charge of making an attribution decision. But I would say it is much more engaged in anticipating the prospect of a deliberate attack than it had been earlier.

Now let me say a few words about the Global Health Security Agenda, which was rolled out in 2014. It's a widespread agreement among nations to prevent, detect, and respond to infectious disease threats "whether naturally occurring, deliberate, or accidental." I really don't want to downplay the importance of having at first 30 countries, and now 65 countries, all agree to addressing three sources of a disease in the same sentence, in the same program. Not all of these countries necessarily put equal attention on each of these three, but they have all signed up for a program that does encompass all three. And again, I think this is indicative of the evolution of views internationally that the deliberate threat is certainly a possibility, it certainly has to be considered. And relationships between what one does in the event of deliberate events and natural events have to be considered and may actually have some synergies. The GHSA's operational aspects consisted of "action packages," which are about building the capacity around the world to adhere to the International Health Regulations, which countries around the world must be able to implement so that they can combat

disease outbreaks locally and work together when outbreaks cross borders. Initially, there were 11 “action packages. Two of them explicitly referred to security aspects—one in terms of biosafety and biosecurity, how one can minimize the deliberate misuse of research and technology, and one in terms of response, building multi-sectoral linkages between the security community and the health community.

The World Health Organization has also participated in meetings associated with the Biological Weapons Convention. There are five-year review sessions that BWC States Parties around the world attend. There’s considerable external participation in these meetings, with non-governmental groups and scientific organizations all contributing. And the WHO does come and participate in these five-year reviews as well.

One of the things the WHO is now doing is working on the interface between health systems and security systems. There are inherent tensions between these two communities, which will always have differing approaches and goals in how they deal with a disease outbreak. In the public health world, science and information and information-sharing are your friends. The more we know about an incident, the more minds that are working on the problem, the more communication and collaboration we have, the better job we’re going to do in piecing together what happened and how to deal with it. In security, not so much. For one, we form categories with respect to countries we generally agree with and countries we have issues with, and we don’t share as much information with one group as with the other. Second, information is much more tightly controlled in a security incident to begin with, because one is trying to catch a perpetrator before he or she can attack again. One necessarily want to tip off the attacker about what methods are being used to get leads on who might be responsible. We don’t want to blow our intelligence capabilities by letting everybody know what know and how we know it. So, there’s inherent tensions between a security approach and a public health approach to a biological incident that can never be waived away. These tensions need to be managed. Internationally, I think they can be by putting government health ministers and government security ministers in each other’s shoes and encouraging them to understand each other’s perspectives. It’s going to require ongoing attention because these managing these relationships is never easy.

So I’d like to thank you for the opportunity to discuss some of the international aspects of counter-ing and responding to bioterrorism, and I’d be happy to answer any questions you may have.

Dr. Meghan Delaney

Chief of Pathology & Laboratory Medicine and Medical Director for Transfusion Medicine, Children's National Medical Center, and Associate Professor of Pathology & Pediatrics, George Washington University

I am a physician from Children's Medical, and I'm going to give you my perspective which will have a medical slant. The topic that I chose to focus on is: Is Healthcare Ready for Biological Terrorism? So, just a little bit of background about my organization and the case I am going to tell you about. Children's National is a hospital located right here in Washington, D.C. It has 323 beds, 15,700 annual admissions, 669,413 outpatient visits, 17,535 surgical procedures, and 1.2 million lab tests per year that I direct. In the U.S. News and World Report ranking, we were ranked the #5 children's hospital in the country.

I'm going to tell you about a case that illustrates healthcare's readiness for international bioterrorism because I didn't really think about it in quite the way I do now until this happened. In medicine, we always joke that the worst things happen on Friday afternoons, and this event is in line with that because it did happen on a Friday afternoon. At about 1:30 in the afternoon, my administrative assistant went and got the mail like she does every day, and there was a suspicious envelope in the pile so she contacted her supervisor. The supervisor immediately took action. He actually donned gloves and took the package to our microbiology laboratory that has all sorts of resources to contain pathogens, and put it in a negative pressure hood. Inside the package was a letter written in Arabic and an old paper with some gray and white substances on it and some loose powder. So, what did we do?

Next, they told me and we notified our safety and emergency management and requested a translator. We are lucky to have a large global services department, and we wanted to see what that letter actually said. We then sent more notifications out including to our onsite Metropolitan Police Department (MPD) officer. The administrative assistant who had touched the mail item was quarantined in my office. The other assistant, who had left for the day, was called and told to stay inside her car outside of her home and to not go inside her home to protect anyone else from potential exposure.

We cleared the immediate area near the fume hood. This is a busy laboratory, we are doing hundreds of tests per day, with three ICUs and an Emergency Department that have patients who are waiting for results at all times, so it was a big deal to actually clear any part of the clinical laboratory. We had our radiation specialist come in to do a test to confirm that the substances were not radioactive. Then, the MPD officer came to me and said, "Dr. Delaney, can you evacuate your entire laboratory? How would you continue patient testing if you had to evacuate this entire laboratory?" I looked at him with raised eyebrows because of the challenge I knew this would be. I'll come back to that later in my talk.

By 16:00 we had retested the fume hood to make sure that it was functioning appropriately at the BSL level of 2-3. The hood itself is checked every six months to ensure it is functioning, but we wanted to be sure since we did not know what was sitting in our hood right now. We stood up our Emergency Command Center, we told legal, hospital leadership, and public relations, and outside agencies were notified. As the outside agencies started to activate, the sirens started coming to the hospital.

Backing up for a minute, let's consider the environment. We have thousands of people who work at our campus or come to see a provider. They will be concerned if they hear sirens and see police activity. The command center decided to send an email out, "You may notice some unusual activity on Michigan Avenue this afternoon. Please be aware that there is currently a situation that has been contained. Out of an abundance of caution, we have contacted authorities and are working collaboratively with them to make sure the situation is safely and quickly addressed in accordance with our policies".

By 17:50, the MPD Bomb Squad was onsite to investigate the package. They didn't tell me what they found, and because I'm a laboratory doctor, I really wanted to know. But they didn't tell me and its possible they didn't know, but did quick tests for dangerous agents to rule those out. They also reviewed the translation. Finally, by 6:09 PM, the MPD Battalion Chief reported to our Emergency Command Center that the scene was clear and that we could dispose of this in the biological waste container and that was the end.

I bring this story to you because this is real, and it brings home the point that international biological terrorism really can happen here in our hospitals in the United States. I thought it was very interesting that that letter was sent to us at Children's. I feel we did deal with the package effectively. We have a whole list of codes, or alerts, that we use at any healthcare facility that included how to escalate a suspicious package. For instance, a Code Blue is when you are pumping on someone's chest to keep the blood flowing during cardiac arrest; a Code White is the suspicious package. We do training for this situation with our staff. We did a debrief of this event to capture what went well and key learnings.

We were troubled that this came through the U.S. Post Office and it wasn't stopped, because when you look at what a suspicious package is supposed to look like, this package hit all of the points. It said "Medical Center Director"—which is me—and it was spelled wrong. It had multiple pieces of postage, "America" was spelled wrong and it didn't have a return address. It had all the bells and whistles of being a suspicious package. We felt that the mail was important to receive follow up. We contacted the U.S. Post Office, the FBI and we let Homeland Security know. We also retrained our own mailroom staff so they would hopefully notice this type of package in the future. Coming back to what I mentioned earlier, I also had to think a lot about evacuation: how am I, as the director of a lab, supposed to take care of all these patients under our care if I had to evacuate our laboratory? It's a challenge and one that we are still working through how to prepare for.

As for the letter translation; it appears as though it were from someone who was trying to send us an herbal remedy that they had concocted which cured everything from pediatric disease—which is why they sent it to National Children’s Hospital—and it also claimed to have cured some fertility problems and other maladies as well. So it was really quite a learning experience, or if you will, a “real” drill.

Now let’s think about hospitals as a resource in an international bioterrorism event—for me, as a medical professional—we think of ourselves as a sentinel for finding the pattern or the agent. Hospital personnel are trained to find patterns and our microbiologists and infection control office staff are observant of patterns and specific pathogens in particular. We also escalate. Hospitals are a direct mainline to the Department of Health. In fact, in Washington, D.C. we will report to three different departments of health (District of Columbia, Maryland and Virginia). We diagnose disease—this is the main part of the job of the lab and radiology and other parts of the hospital. We also characterize pathogens. As Dr. Colwell had said, the laboratories have become very sophisticated. We are able to do a lot of genetic testing in the lab. In fact, we can do molecular testing of more common infectious diseases in an hour or two. Really remarkable.

For surveillance, hospitals have access to the population. If there was an event, and we needed to go back and determine if others were affected or how widespread a disease is, we have thousands of people’s blood samples sitting in the laboratory refrigerator every day that have been tested already. These samples are kept for a couple days before they are discarded. Further, hospitals would be the institution that treats affected patients and also would quarantine if that was necessary. All hospitals have quarantine procedures—a lot of this is based around emerging bacterial resistance we see every day, but this can also be used in a biological terrorism event. Hospitals also try to prevent transmissions by delivering all sorts of vaccination measures and infection control measures programmatically.

Here are two examples that illustrate my recommendations as part of the panel. First is Ebola. As a physician and laboratorian living through the big outbreak in Liberia in 2014, but based here in the US, I have to tell you, it was very difficult in the lab because there was not clear guidance about how we should test these potentially infected samples. We were figuring it out as we went. Now we know what to do, and we have Ebola treatment centers designated throughout the country. Children’s National is an Ebola Treatment center. We are now working on building a laboratory footprint in our biocontainment area of the Ebola Treatment Center. We would never bring a sample down to the main lab because all the rest of the care for the other patients needs to continue. At Children’s we are also moving past the focus on Ebola specifically and now are more inclusive for emergency contingency plans. We are creating business continuity plans at the administrative level in my hospital. Going back to the case I presented to you, if I had to shut down the laboratory space, the business continuity planning is the “how are you going to keep the function of your department going”? We are working on business continuity planning right now for this reason. It is really hard to have a really complicated lab with many machines and hundreds of people turning out the approximately 3,000 tests per day to find a way to move that operation—this is a very difficult thing, but we are trying to figure this out.

As another example, I have to include a word about blood banks. My specific focus besides running the lab is that I run transfusion services and blood banks throughout my career. Here is a picture of a blood donor card from New York City—and you can see that the date is September 11, 2001. One thing that US blood services learned on 9/11 is the amazing outpouring of generosity around mass casualty events. There are pictures that you can find that show long lines of people at every blood donor collection center around the country giving blood after 9/11, and really after any event. What happens is that we collect too much blood, and then it expires because blood doesn't stay good forever and we can only keep it in its plastic bags for a certain amount of time and then unfortunately, it gets thrown away. Learning from that, the blood industry and the AABB inter-organizational task force on domestic disasters, which is supported by HHS and the Department of Homeland Security, is now coordinating blood services for the country when an event happens. To show how this works, we can look at the Zika virus outbreak. When Zika happened, and the FDA shut down blood collection in Puerto Rico, the task force organized so the unaffected blood centers could ship blood to Puerto Rico. The task force also tries to have blood centers ready for a mass casualty event and to ensure that people not over collect at these events. I will also say that internationally, blood transfusion is a really important transmission source for emerging pathogens. Blood can transmit West Nile Virus or anything else that is blood borne through transfusion and transplantation. So it serves an important purpose as a sentinel, but it is also important to be quite conservative regarding our blood supply since it can be a source for transmission.

Thinking more about blood transfusion and about Sub-Saharan Africa (SSA)—I worked there in blood transfusion—it is quite a bit different. People in many SSA countries can die for lack of blood, especially if they are not living in a major city. We take our blood supply for granted here in the United States. And so children, women, and cancer patients might die because they don't have access to a blood transfusion in low income nations. Thus, if we then layer on top of that any sort of event, such as recent typhoon storms in Africa or a biological terrorism event, the infrastructure in low income nations may be much less capable to respond. I agree with Dr Kerr that getting Ministers talking together is a good path forward because having stronger infrastructure in place will make the nation better able to respond to large scale events. It would also better take care of patients on a day to day basis.

Finally, these are my recommendations to the panel. I think that our contingency and emergency plans for our U.S.-based health facilities should be based in preexisting programs that we already have. So, as we prepare for disasters and we prepare for pandemics, we also prepare for international bioterrorism. We have an Ebola treatment plan now for the country, and we continue to strengthen those. I think the laboratories and hospitals are a key component. On the more granular level, staff training is important, as is our ability to treat patients. We also have to be able to consider how to move or transition our operations to fit the situation. I think it is also important for our national networks to be stronger so that we can help other areas function, to function for them if they are not able to function on their own.

CLOSING REMARKS

General (Ret.) Alfred Gray

*Twenty-Ninth Commandant of the United States Marine Corps; Senior Fellow
and Chairman of the Board of Regents, Potomac Institute for Policy Studies*

This is probably one of the finest panels we've ever had—and I've seen a great many of them—so thank you all very much. At a June 2017 seminar, Rita Colwell told us that we were making progress. Rita repeated this, today. We are indeed making progress, but as some of my colleagues have mentioned, we still have a long way to go.

We must understand that some people who historically haven't cared for us, like the former Soviet Union, have had biological capabilities for many years. In 1992, Yeltsin stated: "we do have a biological program [that] we started in 1946." Many people think Yeltsin picked that date because that's when we allegedly turned on a Bunsen burner in biological warfare, ourselves. The facts are that in the early 1920s, the former Soviet Union had a biological weapons program on one of their islands. About 20 years later, they moved it to another location and lied to cover it up. So, this has been going on for a long time and as we've heard today, it's a very difficult problem.

In my humble opinion, one of our biggest challenges is to educate the American people, both at home and abroad, as to what this threat is all about, and more importantly, what to do when something happens. Education about biological terrorism is complicated because it is very technical. Many people don't understand all of the scientific and technical terminology. The complex language should be translated into simple, modern English, using the kind of words that today's young people—as well as the rest of Americans—can understand.

If I were in charge, I would start investigating several major biological warfare scenarios using what I call "wargames." We clearly must have national oversight and interactive engagement overall, but wargaming efforts should begin at the state level, because each individual state has primary control over what to do when these events happen. They have the local and state law enforcement agencies. They have their own hospitals. If we're going to police what the hospitals are doing, we must find out what they are doing in every state. Are they functioning with some degree of consistency? Do they have the same standards? Currently, the answer is no, but that's one of the objectives that would come out of these war games. And, even though it is very difficult to attain inter-agency cooperation, we must make it happen.

We should have these war games in which not just the experts play, but also the principals, so that there is involvement or engagement of leadership within different departments. The first major war game I played as a member of the Joint Chiefs of Staff was in 1987 down in Florida. This was a wargame in the Pacific Region, but it had global concerns, as well. We had Senator Sam Nunn, the former head of the Senate Armed Services Committee, playing the role of President. Senator Tower was there as well, so you know it was the first team down there playing. That's the way you make things happen. But again, as we heard today, we are making progress and we have a long way to go.

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Established in 1994, the activities of IUCTS are guided by an International Research Council that offers recommendations for study on different aspects of terrorism, both conventional and unconventional. IUCTS is cooperating academically with universities and think tanks in over 40 countries, as well as with governmental, intergovernmental, and nongovernmental bodies.

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