



JOHNS HOPKINS

BLOOMBERG SCHOOL  
*of* PUBLIC HEALTH

**Center for Health Security**

TWENTIETH ANNIVERSARY  
20  
18  
ANNUAL REPORT



## | MISSION |

The Center for Health Security works to protect people's health from the consequences of epidemics and disasters and to ensure that communities are resilient to major challenges.

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BACK IN 1998,  
OUR CENTER  
WAS FOUNDED  
ON THE BELIEF  
THAT WE SHOULD  
DO EVERYTHING  
POSSIBLE TO  
PROTECT PEOPLE’S  
HEALTH FROM  
BIOLOGICAL  
THREATS...

AS WE CELEBRATED  
OUR CENTER’S  
20TH ANNIVERSARY  
IN 2018. . .

We will continue our efforts  
to ensure a future in which  
severe pandemics can no  
longer threaten our world.



LETTER FROM THE DIRECTORS

Dear Friends,

Each year there are major events in the world that remind us of the urgent need for improved prevention, preparedness, and response measures to boost our defenses against biological threats. This past year, outbreaks such as Ebola in the DRC, cholera in Yemen, and Nipah in India have again shown how infectious disease can not only cause loss of life, but also lead to broader economic, social, or governance consequences in affected societies. They also pose the threat of spreading more widely, such as the potential for Ebola to spread from the DRC to other countries in the region and beyond. These outbreaks are part of the larger spectrum of potential biological events—whether naturally occurring, or deliberately or accidentally initiated—that could threaten global welfare and stability and that require the attention of governments and international organizations.

Back in 1998, our Center was founded on the belief that we should do everything possible to protect people’s health from biological threats by developing effective policy, programmatic, and scientific tools that can diminish the impact of pandemics and other disasters. As we celebrated our Center’s 20th anniversary in 2018, we had the opportunity to reflect on the progress made over the past 2 decades as well as to undertake a series of new initiatives that we believe will help to push forward progress on these issues. We’re proud to share some of the Center’s past milestones and highlight our current work in this annual report.

We devoted substantial amounts of our energy in 2018 to broadening and engaging the biosecurity community. We believe that in order to get better at preventing or successfully responding to biological threats, it’s essential to question common preconceptions about the type, scale, and likely origins of the kinds of epidemics and pandemics that could occur. In our tabletop exercise Clade X, we challenged the players and broader audience to wrestle with the limitations of our current policy and technical tools in mitigating a near-catastrophic outbreak caused by a genetically engineered virus. During an international meeting that we co-sponsored at Wilton Park in the UK, we fostered a discussion about ways to prevent high-impact biothreats. Consideration of these types of global catastrophic biological threats is often either dismissed or deferred because there are no easy answers. To encourage a more robust and inclusive effort around these challenges, we developed new risk communication strategies for the “very worst cases.”

In this annual report, you will also learn about our extensive science diplomacy initiatives, including our biosecurity dialogues in India and Southeast Asia; our plans to undertake joint collaborative efforts with the first academic NGO in China devoted to improving biosafety policy and practice; our engagement with Pakistan on health security issues; and our first Global Forum on Scientific Advances Important to the Biological & Toxin Weapons Convention.

In 2018 we continued to explore new technologies, systems, and approaches for reducing the impact of severe biological events. We developed a framework to analyze elements of potential pandemic pathogens in order to augment preparedness activities for human infectious disease emergencies. In another Center project, we identified new, potentially breakthrough technologies that could vastly improve our ability to mitigate potentially catastrophic outbreaks.

The resolve needed to continue working to bring about major shifts in policy, practice, and outcomes is made possible with the support of our funders, to whom we are grateful. We will continue our efforts to ensure a future in which severe pandemics can no longer threaten our world.

Thank you and take care,

Tom Inglesby, MD  
Director

Anita Cicero, JD  
Deputy Director

## OUR APPROACH

- CONDUCT RESEARCH AND ANALYSIS ON MAJOR DOMESTIC AND INTERNATIONAL HEALTH SECURITY ISSUES.
- ENGAGE WITH RESEARCHERS, THE POLICYMAKING COMMUNITY, AND THE PRIVATE SECTOR TO MAKE PROGRESS IN THE FIELD.
- CONVENE EXPERT WORKING GROUPS, CONGRESSIONAL SEMINARS, SCIENTIFIC MEETINGS, CONFERENCES, AND TABLETOP EXERCISES TO STIMULATE NEW THINKING AND PROVOKE ACTION.
- EDUCATE A RISING GENERATION OF SCHOLARS, PRACTITIONERS, AND POLICYMAKERS.

## PRIORITY AREAS

Emerging infectious diseases and pandemic flu  
Biosafety and biosecurity  
Medical and public health preparedness and response  
Global catastrophic biological risks  
Community resilience  
Disease surveillance  
Risk communication  
Advanced life science research, including synthetic biology  
Policies on medicine, vaccines, and diagnostics  
Science diplomacy

## COMBINED EXPERTISE

Public health	Internal medicine
Epidemiology	Disease modeling
Infectious diseases	Risk assessment
Global health	Healthcare preparedness
Law	Mass casualty response
Anthropology	Biosurveillance
Biotechnology	Disaster response
Immunology	International relations
Laboratory science	Biological nonproliferation
Critical care medicine	Risk communication
Emergency medicine	

## SPONSORS AND FUNDERS

Open Philanthropy Project  
World Health Organization  
Battelle Memorial Institute  
Johns Hopkins Applied Physics Laboratory  
The Bill & Melinda Gates Foundation  
Rockefeller Foundation  
Robert Wood Johnson Foundation  
Office of the Assistant Secretary for Preparedness and Response (HHS)  
US Centers for Disease Control and Prevention  
US Department of Defense  
US Department of Homeland Security, Science & Technology Directorate  
US Department of State

## BY THE NUMBERS

**370+**  
Media placements




**29**  
Published peer-reviewed articles by staff



**50**  
Presentations and panels




**26%**  
Increase in staff



**210**  
Expert interviews conducted for project research



**34**  
Projects active or pending



**29%**  
Increase in article submissions to *Health Security*



**16,000**  
Views of Clade X videos on YouTube





# 20 YEARS OF HEALTH SECURITY LEADERSHIP



## 1998

First nongovernment organization to study the **vulnerability of US civilian population** to biological weapons and how to prevent, prepare, and respond.

## 1999, 2000

Organized **2 national symposia** on medical and public health response to bioterrorism.

## 2003

Led and shaped national efforts to **engage the public** constructively in epidemic and disaster response policies and programs.

Launched first **peer-reviewed journal** in the field, *Biosecurity and Bioterrorism*, later renamed *Health Security*.



## 2006

Center analysis and advocacy helped to inform the framework for the **Pandemic and All-Hazards Preparedness Act**, as well as the Biomedical Advanced Research and Development Authority (BARDA).



## 2011

Published first nuclear preparedness guidance aimed at public health, medical, and civic leaders in the **Rad Resilient City** initiative.

## 2013-2014

Helped drive debate on **gain-of-function/potential-pandemic-pathogen research**, resulting in US government funding pause and new US policy.

## 2014

One of the first NGOs to publicly support and work for the success of the **Global Health Security Agenda**.

## 2014, 2016

Established Track II SE Asian-US & India-US biosecurity dialogues.

## 1999-2002

Published seminal series of **papers in JAMA** on medical management of biological agents.

## 2001

**Dark Winter** exercise, depicting a smallpox attack on the US, was highly influential in the government's decision to buy national smallpox vaccine stockpile.

## 2002

Findings from 2 Center reports on the **US hospital preparedness program** became the basis for HHS grant guidance for hospitals and communities around the country.

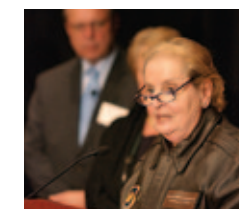
## 2004

Center research helped provoke US policy **examination of "dual-use research."**

Began publishing annual health security **federal funding articles**, used by media and government to understand how biodefense and health security are structured and resourced.

## 2005

**Atlantic Storm** exercise demonstrated interdependence of the international community in the face of epidemics and biological weapons.



## 2012

Created first international fellowship program focused on building biosecurity leadership, **Emerging Leaders in Biosecurity Initiative**.

First effort to report state-wide public views regarding **how to allocate scarce resources** in a pandemic.

## 2013

Helped lead and develop the **National Health Security Preparedness Index**, the first state-by-state index of health preparedness.

## 2017

Published first working paper in field defining **global catastrophic biological risks**, catalyzing a new focus on these issues in the field.



## 2018

**Clade X** exercise was first public tabletop to shine light on major political and policy decisions that will emerge in the event of a global catastrophic biological event.

## A PANDEMIC TABLETOP EXERCISE



The outbreak of a moderately contagious and moderately lethal novel pathogen precipitated a catastrophic end to the scenario in Clade X, the day-long live-streamed pandemic tabletop exercise hosted by the Johns Hopkins Center for Health Security on May 15 in Washington, DC.

Clade X simulated a series of National Security Council–convened meetings of 10 US government leaders, played by individuals prominent in the fields of national security or epidemic response. As the scenario unfolded, they addressed significant uncertainties in current prevention and response capabilities, hamstrung by policy challenges at the federal level.

The scenario opens with a present-day outbreak of a new, serious respiratory disease in Germany and Venezuela. Soon Clade X is identified as a novel strain of human parainfluenza virus with genetic elements of Nipah virus. In the weeks that follow, a fringe group bent on reducing the human population claims responsibility for the creation and intentional release of the disease. There is no vaccine, and pressure grows as pockets of cases appear in the United States. Clade X quickly causes widespread worldwide anxiety as case counts and deaths mount. Within a year, 150 million people die from the disease—15 million in the United States alone.







## PLAYERS

### Secretary of Defense

*Played by Jim Talent*

Visiting Scholar, American Enterprise Institute  
Member, Defense Policy Board  
Former US Representative and Senator (R-MO)

### Attorney General

*Played by Jamie Gorelick*

Partner, Wilmer/Hale  
Former Deputy Attorney General

### Secretary of Health and Human Services

*Played by Margaret Hamburg*

Foreign Secretary, National Academy of Medicine  
President, AAAS  
Former Commissioner, US Food & Drug Administration

### Secretary of Homeland Security

*Played by Tara O'Toole*

Executive Vice President and Senior Fellow, In-Q-Tel  
Former Under Secretary for Science and Technology,  
Department of Homeland Security

### Secretary of State

*Played by John Bellinger III*

Partner, Arnold & Porter  
Former Legal Advisor to the US State Department  
and the National Security Council

### CIA Director

*Played by Jeffrey Smith*

Former Head, Arnold & Porter,  
National Security Practice  
Former CIA General Counsel

### Senate Majority Leader

*Played by Tom Daschle*

CEO, The Daschle Group  
Former Senate Majority and Minority Leader

### Member, US House of Representatives

*Played by Rep. Susan Brooks (R-IN)*

Current member of Congress

### CDC Director

*Played by Julie Gerberding*

Executive Vice President and Chief Patient Officer,  
Strategic Communications, Global Public Policy,  
and Population Health  
Merck & Co., Inc.  
Former CDC Director

## MEDIA COVERAGE HIGHLIGHTS

- *The Washington Post*
- *The New Yorker*
- *MIT Technology Review*
- NPR
- *Business Insider*
- Fox News
- AJ+ (Al Jazeera digital)
- *New York Post*
- *Toronto Sun*
- People from 41 countries visited Center website during exercise
- 307,000 people viewed the AJ+ story on Facebook
- Post-exercise, recorded videos have 16,000 views on YouTube.

## FOLLOW-ON CLADE X EVENTS

- Congressional Policy Forum
- Biological Weapons Convention meeting of experts
- International Conference on Emerging Infectious Diseases
- US Centers for Disease Control and Prevention
- India-US Biosecurity Dialogue
- Johns Hopkins Bloomberg School of Public Health
- Center for Strategic and International Studies Commission event
- Aspen Institute Congressional event
- Congressional simulation
- American Society of Microbiology presentation

## KEY DISCUSSION TOPICS: SHOULD THE US GOVERNMENT ...

- ... ban travel to the United States from countries where the disease is prevalent?
- ... quarantine the area in the United States where the first outbreak occurred?
- ... send medical response to hostile countries abroad?
- ... bring US military/federal personnel and their families home from overseas?
- ... prioritize those with key societal functions, or prioritize those who would most likely benefit, once a vaccine is developed?

“Lack of preparation is not an option. A mock pandemic exercise hosted last month by Johns Hopkins Center for Health Security with a group of current and former government officials, including our own colleague Susan Brooks, I’m told was quite eye-opening. The exercise resulted in a failure to develop a vaccine within 20 months, and that led in this exercise to 150 million deaths globally. So obviously, we’ve got to do more to be prepared for these types of outbreaks.

“So that’s where the reauthorization of the Pandemic and All Hazards Preparedness Act comes in. PAHPA originally was adopted in 2006. It’s set to expire at the end of September. We intend to move forward with legislation prior to that.”

~ Congressman Greg Walden (R-OR), June 15, 2018, hearing, “Biopreparedness: Responding to Biological Attacks, Pandemics, and Emerging Infectious Disease Outbreaks”

“We talked a lot about leadership, but it’s not just leadership in a crisis but leadership between the crises that’s even more important.”

Tom Daschle  
~ *Playing Senate Majority Leader*



CLADE X WAS A DAY-LONG  
LIVE-STREAMED PANDEMIC  
TABLETOP EXERCISE  
ON MAY 15  
IN WASHINGTON, DC.



“We need to think about medical countermeasures the way we think about the needs of the navy, the air force, or the army. We’re just not taking it seriously enough. We are in an age of epidemics for a variety of reasons. We are going to see more and more disease outbreaks, and we have got to develop an effective strategy for dealing with them.”

~Tara O’Toole, *Playing Secretary of Homeland Security*



“This issue [biosecurity] has the amazing capacity to be number 11 on anybody’s list of the 10 most important items, and somehow or other we have to break through the cacophony in Washington of people competing for money ... to make this the issue that it deserves [to be].”

~ Jeffrey Smith  
*Playing CIA Director*

“Our most salient point [of the 911 Commission] was that there was a failure of imagination. We could not imagine an event like this [Clade X], and therefore we did not approach the challenge with the urgency needed to break through some of the barriers.”

~ Jamie Gorelick  
*Playing Attorney General*





## SENATE TESTIMONY ON PAHPA REAUTHORIZATION

Of the many proactive policy steps the US government has taken to ensure the nation is better prepared for a range of major public health threats, passing the Pandemic and All-Hazards Preparedness Act of 2006 (PAHPA) is among the most important. PAHPA's purpose is to strengthen the nation's public health and medical preparedness and response capabilities for emergencies, whether deliberate, accidental, or natural. As of 2018, many of the act's provisions were set to expire absent reauthorization from Congress.

The US Senate Committee on Health, Education, Labor, and Pensions invited Center Director Tom Inglesby to testify at a hearing on the bill in early 2018. During the hearing, Inglesby said the United States must strengthen healthcare system preparedness, strengthen the ability of the public health system to detect and respond to threats, move ahead in medical countermeasure development, recognize threats that could emerge from biological research, and fund the Global Health Security Agenda.

“IMPROVING OUR NATION’S  
PREPAREDNESS AND RESPONSE  
CAPACITY IS A DAUNTING AND  
COMPLEX ENDEAVOR, BUT I AM  
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ON THESE INITIATIVES.”

The legislation has since been renamed the Pandemic and All Hazards Preparedness and Advancing Innovation Act of 2019, and it is expected to pass in 2019.





## POLICIES TO STRENGTHEN US HEALTH SECTOR RESILIENCE

The Center held an event in February 2018 at the National Press Club to release *A Framework for Healthcare Disaster Resilience: A View to the Future*, a report funded by the Robert Wood Johnson Foundation.

In the report, Center researchers concluded the health sector in the United States would be far better positioned to manage medical care needs during emergencies of any scale by empowering existing healthcare coalitions to connect community resilience efforts with regional networks of hospitals equipped to handle disasters.

“Change is needed, but the change should be evolutionary, not revolutionary. We need to build on the resources we already have,” said Eric Toner, MD, a senior scholar at the Center and principal investigator on the report.

While the US health sector is reasonably well prepared for relatively small mass injury/illness events that happen frequently (e.g., tornadoes, local disease outbreaks), it is less prepared for large-scale disasters (e.g., hurricanes) and complex mass casualty events (e.g., bombings) and poorly prepared for catastrophic health events (e.g., severe pandemics, large-scale bioterrorism). These gaps, the Center wrote in its report, exist as a result of the absence of strategies above and beyond the traditional all-hazards approach to improving US health sector preparedness.

Center authors offered 4 recommendations for closing preparedness gaps unique to the US health sector: build a culture of resilience, create a network of disaster centers of excellence, increase support for healthcare coalitions, and designate a federal coordinator for catastrophic health event preparedness.

“There needs to be more focus at the federal level, particularly on catastrophic health events,” said Toner.

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BE MORE FOCUS AT  
THE FEDERAL LEVEL,  
PARTICULARLY ON  
CATASTROPHIC  
HEALTH EVENTS.”



## DISCUSSION WITH CDC DIRECTOR ON EBOLA IN DRC

As part of its commitment to facilitating dialogue among policymakers about emerging health security threats, the Center organized a November 2018 event on Capitol Hill to give congressional staffers and other public health stakeholders an opportunity to hear an update from the Centers for Disease Control and Prevention on the US response to the Ebola outbreak in the Democratic Republic of the Congo.

In extensive comments during the event, Robert Redfield, MD, director of the CDC, emphasized that security concerns in the region are the preeminent factor hindering US response, preventing CDC staff from safely accessing the areas where virus transmission is occurring.

“This is one of the challenges: whether we’re able to contain, control, and end the current outbreak with the current security situation,” said Redfield.

This outbreak of Ebola virus disease began in early August 2018. At the time of the Center’s event only a few months later, the DRC’s Ministry of Health had identified 300 suspected or confirmed cases and more than 150 deaths. The outbreak is the second largest Ebola outbreak in history and the largest in the DRC. By early 2019, the reported case count had grown to more than 800.





## POWERFUL ACTOR, HIGH-IMPACT BIOTHREATS

In November 2018, the Center for Health Security, the Nuclear Threat Initiative, the Future of Humanity Institute, and the Wilton Park program of the Foreign Commonwealth Office jointly sponsored a conference at Wilton Park, England, titled “Powerful Actor, High-Impact Biothreats.” This international group of senior policy leaders, scientific and technical experts, and nongovernment experts in the field gathered to deepen discussion and examination of international policy regarding high-impact, low-probability biological weapons. Together, the group identified areas of consensus and uncertainty and future priorities, and published a report with recommendations for international action.

## GLOBAL FORUM AT THE BWC MEETING OF STATES PARTIES

In December 2018, the Johns Hopkins Center for Health Security convened the first annual Global Forum on the Prevention of Advanced Biological Threats, coinciding with the 2018 Meeting of States Parties to the Biological and Toxin Weapons Convention (BWC) in Geneva, Switzerland. The forum aimed to inform States Parties’ delegations of cutting-edge biological capabilities, including the ability to engineer pathogens or more complex organisms, and to build awareness of and support for international bioweapons nonproliferation norms among the scientific community. Advanced biology, engineered pathogens and other organisms, and accidental biological threats as sources of risk are of great concern to international biological nonproliferation regimes such as the BWC. Advanced biology also can lead to potential solutions to deter and prevent the deliberate and accidental misuse of biology.

During the Global Forum, experts discussed the current and future biological capabilities that are of concern to the BWC, either because they could potentially be misused or because they could provide benefit to the BWC and strengthen bioweapons nonproliferation norms.

The Center’s Global Forum will be an annual event in which BWC delegations and scientists can exchange the latest information and views on the leading edge of biotechnology.

## GLOBAL HEALTH SECURITY IN SOUTH ASIA

On July 10, 2018, in Washington, DC, the Center for Health Security convened a meeting on health security in South Asia. The goal of the meeting was to discuss health security challenges in South Asia and to identify opportunities for implementation of health security initiatives. The speakers included high-level experts and health officials from Pakistan and India, the World Bank, the US Centers for Disease Control and Prevention, the US Department of Health and Human Services, the US National Academies of Science, and from other academic, nonprofit, and government organizations. The meeting was sponsored by the Project on Advanced Systems and Concepts for Countering WMD (PASCC; sponsored by the Defense Threat Reduction Agency, DTRA) of the US Air Force Institute for National Security Studies.

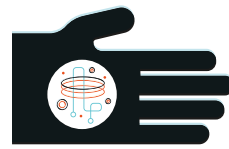
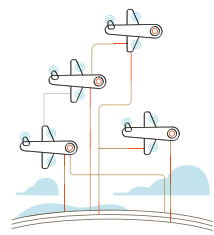
The meeting presented an opportunity to focus on the health security challenges facing South Asia and to identify paths forward, and it emphasized the importance of dialogue in bringing together multiple disciplines, sectors, and countries to consider solutions that could benefit the region.











## TECHNOLOGIES TO ADDRESS GLOBAL CATASTROPHIC BIOLOGICAL RISKS

“While systems to respond [to an outbreak] are in place in many areas of the world, traditional approaches can be too slow or limited in scope to prevent biological events from becoming severe, even in the best of circumstances,” wrote the Center authors of a report on selected technologies. The project team explored how strategic investment in promising technologies could help make the world better prepared and equipped to prevent future infectious disease outbreaks from becoming catastrophic events.

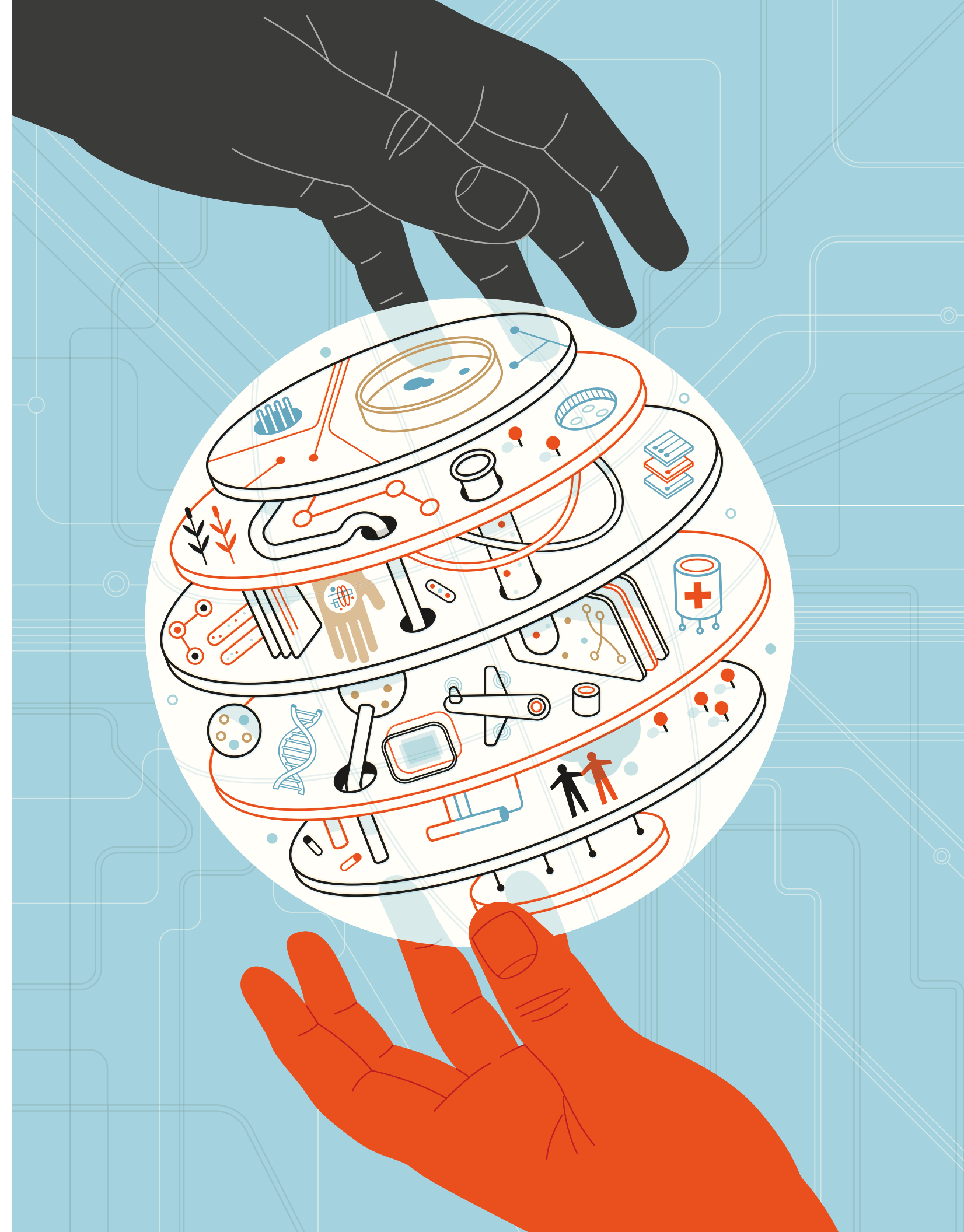
These emerging technologies and their potential application are the focus of the Center’s report, *Technologies to Address Global Catastrophic Biological Risks*, released in October 2018. The study is among the first to assess technologies for the purpose of reducing GCBRs.

Through an extensive literature review and interviews with more than 50 experts, the Center project team identified 15 example technologies and grouped them into 5 broad categories that are highly relevant to public health preparedness and response:

- Disease Detection, Surveillance, and Situational Awareness
- Infectious Disease Diagnostics
- Distributed Medical Countermeasure Manufacturing
- Medical Countermeasure Distribution, Dispensing, and Administration
- Medical Care and Surge Capacity

The team evaluated each technology and formulated guidance for funding decisions. That process informed their high-level assessment of the readiness of each technology (from early development to being field-ready), the potential impact of the technology on reducing catastrophic risks (from low to high), and the amount of financial investment that would be needed to meaningfully deploy the technology (from low to high).

Their work contributes new ideas to a field in need of innovation despite important, ongoing progress in both the public and private sectors to address pandemic risk.







## HEIGHTENING AWARENESS AND MOTIVATING ACTION AROUND GLOBAL BIOLOGICAL RISKS

What is the most effective strategy for communicating about global catastrophic biological risk? How can advocates reframe the discussion to help them catalyze international support for work on pandemic prevention and response? What can be learned from past communication efforts around major threats?

*Risk Communication Strategies for the Very Worst of Cases: How to Issue a Call to Action on Global Catastrophic Biological Risks*, a report to be released in early 2019, outlines current awareness gaps—present inside and outside the scientific community—and identifies opportunities for communication to close them.

The project team developed their effective communication recommendations based on insights gleaned from speaking with experts and research into prominent historical examples of when it became essential to alert policymakers, practitioners, and the public to the possibility of a catastrophic or existential threat.

Interviews with more than 40 experts from 11 countries and across 19 disciplines revealed important overarching themes. The experts differed on their definition of what poses the greatest global catastrophic biological risks, with the focus among those interviewed diverging between an emphasis on well-known, naturally occurring pandemics and engineered (i.e., man-made) pathogens resulting from advances in biotechnology. Interviewees agreed that rallying a coordinated preparedness and response effort will be difficult in a fractured world, even though these events could affect everyone.



Historical research was distilled into 3 case studies: climate change, bioterrorism, and nuclear winter. Narratives in the report examine these global scale threats from the perspective of experts who played a key role in first characterizing the risk and then moving it into the public domain. From these experiences the project team discerned potential strategic communication lessons applicable to global catastrophic biological risks.

**HISTORICAL RESEARCH  
WAS DISTILLED INTO 3  
CASE STUDIES: CLIMATE  
CHANGE, BIOTERRORISM,  
AND NUCLEAR WINTER.**

## INDIA-US BIOSECURITY DIALOGUE

The Center is leading and facilitating the third year of Track II dialogue on biosecurity among former government officials, scientists, and public health experts in India and the United States. There are multiple goals for the dialogue: to expand knowledge and understanding between India and the United States about biological threats; to increase awareness and the probability of exchanges for early warning and detection of unusual biological events; to deepen relationships between participants, who can serve as technical resources to each other going forward; and to identify issues that may warrant official government-to-government priority.

Bilateral ties between the United States and India, the world's two largest democracies and major centers for biotechnology, are of great consequence to global security, defense, and health. In an era of rapid globalization, major geopolitical transitions, and evolving national security landscapes, partnership between the two nations on critical issues in biosecurity are particularly important. Developing shared bilateral understandings of and approaches to tackling difficult problems in biosecurity promises to strengthen trust and cooperation between the countries and facilitate collaborative efforts among Indian and American policymakers, national security experts, life scientists, public health professionals, and healthcare practitioners.

## MULTILATERAL BIOSECURITY DIALOGUE WITH SINGAPORE, MALAYSIA, INDONESIA, THE PHILIPPINES, THAILAND, AND THE UNITED STATES

The Center hosts a multilateral Track II biosecurity dialogue among biosecurity experts from Singapore, Malaysia, Indonesia, the Philippines, Thailand, and the United States to promote engagement that helps improve national and regional responses to natural, accidental, and deliberate biological events. Dialogue participants discuss challenges and best practices relating to Southeast Asia's increasingly complex biosecurity risk landscape—natural outbreaks of emerging and potential pandemic pathogens, porous borders and highly mobile populations, rising terrorism threats, and a rapidly growing biotechnology industry—as they explore how they can work together to strengthen preparedness.





## OUTBREAK OBSERVATORY

Much of the research traditionally conducted during outbreaks necessarily focuses on epidemiology and clinical patient care, but less effort is dedicated to analyzing and improving the operational aspects of outbreak responses. The Outbreak Observatory was created by the Center to collect and analyze data to identify challenges and lessons broadly applicable to outbreak response operations, including disease surveillance systems, nonpharmaceutical interventions, medical countermeasures distribution and dispensing, collaboration between public health and healthcare systems, public communication, and the resources and infrastructure required to develop and maintain response capacity.

In 2018, the Outbreak Observatory published its first peer-reviewed article, a collaboration with the Taiwan Centers for Disease Control to share lessons from its seasonal influenza mass vaccination program. The Outbreak Observatory team also partnered with the National Association of County and City Health Officials, the New York City Health+Hospitals healthcare network, and local health officials in Chester County (PA) and Multnomah County (OR) to investigate responses to hepatitis A, seasonal influenza, mumps, and measles outbreaks. The Outbreak Observatory publishes the weekly Outbreak Thursday blog, which covers a broad scope of domestic and international infectious disease outbreaks and associated challenges.

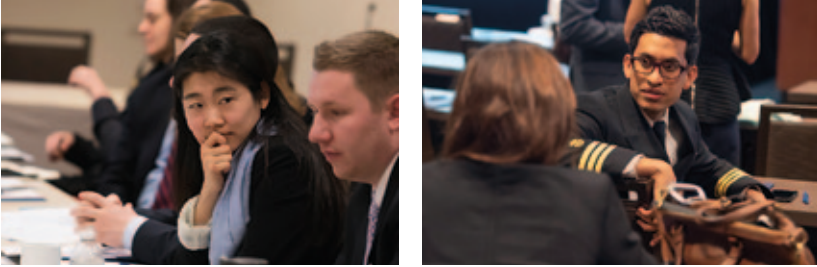


THE OUTBREAK  
OBSERVATORY WAS  
CREATED BY THE  
CENTER TO COLLECT  
AND ANALYZE DATA TO  
IDENTIFY CHALLENGES  
AND LESSONS BROADLY  
APPLICABLE TO  
OUTBREAK RESPONSE  
OPERATIONS...

## EMERGING LEADERS IN BIOSECURITY FELLOWSHIP

The Emerging Leaders in Biosecurity Fellowship is an opportunity for talented career professionals and graduate students to deepen their expertise, expand their professional networks, and build leadership skills through a series of sponsored events coordinated by the Johns Hopkins Center for Health Security. This highly competitive part-time program boasts more than 160 alumni from a wide variety of organizations in government, the private sector, and academia. Together, they represent the foundation of the next generation of leaders in the biosecurity community.

This year the fellows attended 3 multi-day workshops in Oxford, UK, and Washington, DC, and had a range of in-person networking opportunities. They have access to other engagement activities and some of the top minds in domestic and global health security.





## MENTORING AND COLLABORATING WITH TIANJIN CENTER FOR BIOSAFETY RESEARCH & STRATEGY

Recognizing the great importance of China's engagement on health security issues, the Center reached out, in early 2018, to China's first nongovernmental academic center on biosafety and biosecurity, Tianjin University's Center for Biosafety Research & Strategy (CBRS). The Center for Health Security and CBRS have since had a series of productive exchanges about law, policy, and best practices related to biosecurity threats. They have also exchanged views on codes of conduct for researchers in the biosciences, the Biological Weapons Convention, mentoring students and early career professionals in biosafety and biosecurity fields, and dual-use science. The two centers are eager to find collaborative projects that promote policies and practices for the responsible use of biology in the United States and China in response to the explosive growth in biotechnology and synthetic biology. The Center is planning on cohosting a workshop on these topics with CBRS in July 2019 in Washington, DC.



## CONTINUITY OF COMMUNITY FUNCTIONS AND THE ROLE OF SURVIVORS IN A GCBR

In the wake of a truly catastrophic pandemic, many people who fill important roles in society could be debilitated or dead, leaving areas, countries, or regions vulnerable to collapse. The Center is developing a strategic plan, for consideration by governments, to empower people who have recovered from a disease and are immune ("survivors") to volunteer in roles that support community functioning in order to limit secondary and tertiary consequences of a global catastrophic biological event. In this kind of event, community functioning will suffer as the workforce is reduced because of illness or quarantine and as people become less willing to participate in high-contact public activities. Those with immunity could volunteer in low-skill, high-need tasks like delivering groceries, transporting lab samples, or conducting well-being checks on vulnerable people. After constructing a framework for an immune volunteer program, the Center will advocate for its refinement and adoption by US policymakers.

## COLLABORATION WITH WHO ON INTENTIONAL THREATS

As the World Health Organization (WHO) continues to expand its capabilities to prepare for and respond to deliberate events, its in-house team has acknowledged it needs additional technical expertise and support. The Center is working to become a trusted partner and official WHO Collaborating Centre for matters of public health preparedness and response, particularly as it relates to deliberate and large-scale events. In 2018 Center staff provided WHO personnel with on-site support and participated in a workshop to identify and prioritize areas in global health security where WHO should focus on building in-house capacity. This included revising a WHO guidance on public health response to biological and chemical weapons, which the Center has continued to support by providing technical expertise and developing content recommendations.

Additionally, WHO has collaborated with the Center to produce a post-JEE national assessment tool for biological and chemical deliberate events and an influenza vaccine allocation support tool. And WHO has recently established a Health Security Interface Technical Advisory Group and requested support from the Center in developing a tabletop exercise and facilitating the advisory group's discussion.

## MODERNIZE OUTBREAK SCIENCE TO ADDRESS GCBRS

There are institutional and technical gaps that have prevented government officials responsible for responding to outbreaks from having access to epidemiologic and modeling data that use the most effective, modern computational tools. The Center is undertaking an ambitious effort to establish a new subfield of "outbreak science" in order to solve these chronic and significant shortcomings. With sufficient investment, outbreak science can transform and improve how the United States, and eventually other countries, respond to outbreaks through cutting-edge disease modeling, data science and visualization, and modern data practices. There is currently no standing US government capability to access expertise and insights from the extensive use of infectious disease modeling to support decision making during public health emergencies. After consultation with a diverse array of experts, the Center is preparing a detailed proposal calling for the establishment of a National Outbreak Science program that will enable, expedite, and better inform data-driven decision making around modeling in the federal government during infectious disease emergencies.

## EXTRAORDINARY INSIGHTS

Outside of a small circle of subject matter experts, most people find the benefits and risks of the emerging biotechnology revolution difficult to understand, given the technical nature of the material and the uncertainty about what concrete contributions will emerge from the field—and particularly how synthetic biology may contribute to preventing and responding to global catastrophic biological risks. The Center is conducting a study that will make explicit the potential value of synthetic biology to these efforts and will give recommendations on what actions the government, the academic community, and the biotech industry should take to reduce risks.

## MENTORING AND COLLABORATING GLOBAL HEALTH SECURITY INDEX

Together with the Nuclear Threat Initiative and the Economist Intelligence Unit, the Center is creating the first-ever Global Health Security Index. The Index, to be published in 2019, will address 196 countries' technical, financial, socioeconomic, and political capabilities to prevent, detect, and rapidly respond to epidemic threats with international implications, whether naturally occurring, deliberate, or accidental. A primary goal of the Index is to help political leaders and potential donors recognize the need to prioritize global health security and invest in building specific capacities to prevent outbreaks from becoming epidemics and pandemics.

## MITIGATING BIOLOGICAL RISKS THROUGH RED TEAMING EXERCISES

What are society's yet-to-be-identified biosecurity vulnerabilities that emerge from deliberate misuse of science, and how can we prevent those threats? The Center addressed these questions through a series of red teaming exercises that presented fictional scenarios to 18 small teams of practicing scientists who are part of the vanguard of advanced life science research. A “red team,” traditionally used by defense agencies and private companies, is an independent group that challenges an organization to improve its effectiveness through analysis of its vulnerabilities. Red teams have not been widely used in the context of deliberate biological attacks, and the Center developed a workable model for effective red teaming exercises in this context. Through this process, the Center helped to identify where strategic investment in prevention tactics could best mitigate risk.

## BEATING PANDEMICS BY ENSURING VACCINATION CAPABILITIES AT THE LAST MILE

If a vaccine existed to effectively vaccinate people against a fast-moving epidemic, it would still need to be distributed to affected areas, further dispensed to affected populations, and accepted by communities. Through extensive interviews with state and local public health officials, the Center is working to determine the existing level of capabilities and capacity at the local level to implement mass vaccination operations, as well as barriers to planning and implementing those operations. Historically, federal guidance and funding for state and local dispensing of medical countermeasures has been narrow—confined to a “pill model” (e.g., antibiotics after an anthrax attack). Insights from this project will yield recommendations for reevaluating federal government guidance and resources to better support state and local health officials in their efforts to develop and maintain mass vaccination capabilities.

## A STRATEGIC LOOK AT EXISTING MCM MANUFACTURING CAPACITY AND EXPLORING DISTRIBUTIVE APPROACHES TO EXTENDING GLOBAL CAPACITY

Global capacity to scale up production of vaccines and other medical countermeasures and to distribute them around the world in the event of a global pandemic is severely limited. This is the case for novel vaccines that would be developed in the setting of new epidemics, but it is also the case for rapid scaling up of the production of licensed vaccines. The Center's forthcoming report on this project will identify specific gaps that make scaling such a technical challenge and will provide policy solutions that could accelerate production in a crisis.

## COLLECTIVE INTELLIGENCE FOR DISEASE PREDICTION

There is an ongoing need for better prediction tools so that society can improve its chances of mitigating or stopping the spread of a dangerous outbreak. The Center is inviting a diverse group of international experts to make predictions about the outcomes of outbreaks. If such a tool shows that predictions of the group can accurately forecast future events, this type of tool could provide public health leaders with forecasting data to help make better their decisions about preparedness and response policies and interventions. Throughout the project, the Center will analyze forecasting data from participants and share key insights with health sector stakeholders to supplement traditional surveillance and modeling efforts. Since the platform launched in early January 2019, more than 400 people have signed on to the tool. Individuals are making weekly predictions in response to a series of questions about infectious diseases and other public health events, with new prediction questions added weekly.

## VACCINE PLATFORMS: STATE OF THE FIELD AND LOOMING CHALLENGES

Preventive vaccination against potential pandemic pathogens is key to minimizing risk, but the time to develop vaccines in a traditional manner can be too long and not amenable to rapid scale up or strain-change modification. Vaccine platform technologies have emerged as a promising solution. What are the key questions and challenges surrounding these technologies? The Center has developed a roadmap to understanding the current state of play for vaccine platforms and recommendations for how policymakers can help scientists and developers realize the promise these platforms might bring.

## BOOSTING NATO RESILIENCE TO BIOLOGICAL THREATS

While many NATO members have prepared for at least some unconventional threats, strategic alliances as well as partnerships between allies are vulnerable to biological attack and need to be protected. The key first step is to integrate public health and national security communities to supplement the traditional security focus on protecting territories with a new focus on protecting connectedness. The Center is assessing current NATO preparedness for biological threats and will run a tabletop scenario exercise for Permanent Representatives to the North Atlantic Council and NATO's International Staff. A “lessons learned” discussion will follow the exercise; findings will be published, and the Center will engage with NATO as they increase their preparedness.

## ASSESSING MASS VACCINATION TECHNOLOGIES

Vaccinating vast numbers of people during a fast-moving epidemic is extremely challenging with current technology and practices. The Center is conducting an assessment of possible strengths and challenges of novel next-generation vaccine administration technologies that may have the potential to make mass vaccination more efficient by addressing existing limitations of the conventional needle and syringe approach. The project will also examine the self-administration of vaccines from organizational, scientific, and regulatory perspectives.

## COMMUNICATING ABOUT EPIDEMIC EVENTS IN AN ENVIRONMENT OF MISINFORMATION

In the setting of a pandemic or other global catastrophic biological event, misinformation is likely to spread widely and rapidly on social media. This could seriously hinder public health communication and response efforts. This project is researching how misinformation about infectious disease emerges and spreads, and it is looking at ways to combat it, with the goal of improving strategies for communication during infectious disease outbreaks with pandemic potential. The project team is analyzing 72,000 tweets about Ebola from the 2014 outbreak to find trends in the ways misinformation travels and to identify major themes that may affect future communication in infectious disease crises.



HEALTH SECURITY

A BI-MONTHLY PEER-REVIEWED SCHOLARLY JOURNAL

HEALTH SECURITY PROVIDES RESEARCH AND POLICY DISCUSSIONS ON A WIDE RANGE OF ISSUES RELEVANT TO THE FIELD. IT EXPLORES THE ISSUES POSED BY DISEASE OUTBREAKS AND EPIDEMICS; NATURAL DISASTERS; BIOLOGICAL, CHEMICAL, AND NUCLEAR ACCIDENTS OR DELIBERATE THREATS; FOODBORNE OUTBREAKS; AND OTHER HEALTH EMERGENCIES.

It offers important insight into how to develop the systems needed to meet these challenges. The Journal is a key resource for practitioners in scientific, military, and health organizations, as well as policymakers, scientific experts, and government officials. This year the journal included a CDC-sponsored supplement titled “Building the Base for Global Health Security Implementation.”



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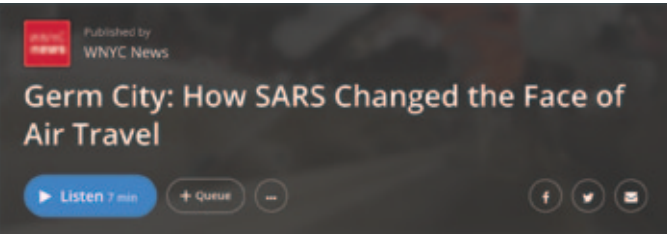
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Countries where authors live:

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Colombia	India	Taiwan
DRC	Israel	Togo
Ecuador	Italy	Uganda
Egypt	Nigeria	United States
Ethiopia	Pakistan	Vietnam
	Russia	

IN THE NEWS

Media quoted Center staff or referenced the Center’s work more than 370 times in 2018, a 100% increase over the total media coverage from the prior year. The Center appeared in stories by NBC News, the *New York Times*, the *Washington Post*, the *Atlantic*, *USA Today*, *Science* magazine, Vox, the *Huffington Post*, *Austin American-Statesman*, and UK *Telegraph*, among many others.



What happens when an airline passenger shows symptoms of a serious infectious disease mid-flight? The CDC quarantined an Emirates Airline plane from Dubai after it landed at JFK Airport in September because multiple people on board were suspected of having a flu-like illness. “It’s much easier when [public health officials] have a postcard with everyone’s name and information on it so that they can contact them if something epidemiologically significant was on board,” Senior Scholar Amesh Adalja, MD, told WNYC radio in a follow-up story about outbreak threats and air travel. The passengers were diagnosed with common cold or seasonal flu—not MERS, as was originally feared.

Senior Scholar Gigi Gronvall, PhD, was interviewed for the smallpox episode of the documentary series “Invisible Killers,” which aired in March on the Discovery Channel. The series looked at how viruses have shaped our health and history, the biological and social impact they have on our global society, and the science that has arisen to combat them.



OP-EDS



In their February op-ed in *The Hill*, Senior Scholars Jennifer Nuzzo, DrPH, and Tara Kirk Sell, PhD, link challenges in flu response to gaps in overall US outbreak preparedness. “Vaccines are in high demand, hospitals are stressed, and the nation’s public health system as a whole is struggling to meet the demands of a disease for which there are effective medical countermeasures and decades of research, and we know to expect every year,” they wrote. “What does this mean about our ability to manage the next big bio threat?” They urged Congress to reverse years of funding cuts to public health organizations and initiatives, and for the US government to maintain its commitment to working overseas to prevent, detect, and respond to infectious disease threats at their source.

“The only way to stave off a catastrophic outcome in our Clade X exercise,” wrote Center Director Tom Inglesby, MD, and Senior Scholar Eric Toner, MD, in their September op-ed in the *Washington Post*, “would have been a global public health system capable of rapidly detecting and responding vigorously to a nascent outbreak before it could become a pandemic, something that was not possible given how events in the scenario unfolded.” They went on to enumerate several important calls to action for policymakers and industry in their efforts to keep pace with threats related to rapid advancements in biotechnology.

E-NEWSLETTERS

*Clinicians' Biosecurity News (CBN)*, an email newsletter, is written and edited by Drs. Amesh Adalja and Eric Toner. It provides updates on new developments in a range of clinical research and practice areas that intersect with biosecurity and health security.

*Health Security Headlines* is a daily email digest of news and developments in health security sent to more than 2,500 subscribers. Matt Watson edits the newsletter.

*Preparedness Pulsepoints* is a weekly email update on US government action in readiness and response. The newsletter is edited by Diane Meyer, RN, MPH, and has more than 2,500 subscribers.

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