Shifts in Global Health Security: Lessons from Ebola
Ebola Successes and Challenges and What They Mean for Future Health Security Threats

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UPMC Center for Health Security
Successes of Ebola Response
U.S. Leadership in Global Response
Total Funding Commitments for Ebola

2014 & 2015 TOTAL FUNDING FOR THE EBOLA RESPONSE*
PER DONOR

* Funding figures are as of April 14, 2015. All international figures are according to the UN Office for the Coordination of Humanitarian Affairs (OCHA) Financial Tracking Service and based on international commitments during 2014 and to date in 2015, while USG figures are according to the USG and reflect USG commitments from FY 2014 and FY 2015, which began on October 1, 2013, and October 1, 2014, respectively.
Clean Water, Children’s Health, Nutrition Rise To Top Of Public’s Global Health Priorities

I’m going to read you some different areas in which the U.S. might contribute to efforts to improve health in developing countries, and for each, I’d like you to tell me if this should be one of the top priorities, important but not a top priority, or not that important.

<table>
<thead>
<tr>
<th>Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving access to clean water</td>
<td>57%</td>
</tr>
<tr>
<td>Children’s health, including vaccinations</td>
<td>53%</td>
</tr>
<tr>
<td>Reducing hunger and malnutrition</td>
<td>52%</td>
</tr>
<tr>
<td>Fighting the Ebola outbreak in West Africa</td>
<td>44%</td>
</tr>
<tr>
<td>Preventing and treating HIV/AIDS</td>
<td>39%</td>
</tr>
<tr>
<td>Combating global pandemic diseases like swine flu</td>
<td>36%</td>
</tr>
<tr>
<td>Building and improving hospitals and other health care facilities</td>
<td>36%</td>
</tr>
<tr>
<td>Efforts to reduce the number of women who die during childbirth</td>
<td>34%</td>
</tr>
<tr>
<td>Preventing and treating tuberculosis</td>
<td>32%</td>
</tr>
<tr>
<td>Preventing and treating malaria</td>
<td>27%</td>
</tr>
<tr>
<td>Eradicating polio</td>
<td>26%</td>
</tr>
<tr>
<td>Preventing and treating heart disease, other chronic diseases</td>
<td>26%</td>
</tr>
<tr>
<td>Improving access to family planning, reproductive health</td>
<td>25%</td>
</tr>
</tbody>
</table>

NOTE: Items asked of half sample. Not at important (voi) and Don’t know/Refused answers not shown.
SOURCE: Kaiser Family Foundation Health Tracking Poll (conducted December 2-9, 2014)
American’s Confidence in Healthcare Authorities To Prevent the Spread of Ebola

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>REPUBLICIANS</th>
<th>INDEPENDENTS</th>
<th>DEMOCRATS</th>
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<tbody>
<tr>
<td>The U.S. Centers for Disease Control and Prevention (CDC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 8–14, 2014</td>
<td>73%</td>
<td>70%</td>
<td>72%</td>
<td>79%</td>
</tr>
<tr>
<td>Oct. 17–19, 2014</td>
<td>62%</td>
<td>50%</td>
<td>65%</td>
<td>70%</td>
</tr>
<tr>
<td>Change (percentage points)</td>
<td>-11*</td>
<td>-20*</td>
<td>-7</td>
<td>-9*</td>
</tr>
<tr>
<td>Your local hospitals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 8–14, 2014</td>
<td>64%</td>
<td>64%</td>
<td>60%</td>
<td>69%</td>
</tr>
<tr>
<td>Oct. 17–19, 2014</td>
<td>62%</td>
<td>52%</td>
<td>63%</td>
<td>71%</td>
</tr>
<tr>
<td>Change (percentage points)</td>
<td>-2</td>
<td>-12*</td>
<td>+3</td>
<td>+2</td>
</tr>
<tr>
<td>Your state or local health departments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 8–14, 2014</td>
<td>62%</td>
<td>61%</td>
<td>61%</td>
<td>67%</td>
</tr>
<tr>
<td>Oct. 17–19, 2014</td>
<td>58%</td>
<td>53%</td>
<td>56%</td>
<td>63%</td>
</tr>
<tr>
<td>Change (percentage points)</td>
<td>-4</td>
<td>-8</td>
<td>-5</td>
<td>-4</td>
</tr>
</tbody>
</table>

* indicates a statistically significant difference between Oct. 8-14, 2014 poll and Oct. 17-19, 2014 poll

Expansion of Diagnostic Capabilities
Status of Laboratories, December 2014

apps.who.int/ebola/en/status-outbreak/situation-reports/ebola-situation-report-31-december-2014
In an emergency, the FDA may issue EUAs to allow the use of drugs, devices, and medical products not previously approved, cleared, or licensed.

The 2014 Ebola outbreak warranted the use of EUAs.

- Since August 5, 2014, ten diagnostic tools have received EUA clearance authorizing their use among patients with signs and symptoms of the Ebola virus.

The EUA approved diagnostic tools resulted in increased Ebola testing capacity.
Challenges of Ebola Response

www.washingtontimes.com/cartoons/dana-summers/are-you-sure-we-shouldnt-be-worried-about-ebola-vi/
Insufficient Surveillance

Ebola — A Growing Threat?
Heinz Feldmann, M.D.

The recent emergence of Zaire ebolavirus in West Africa has come as a surprise in a region more commonly known for its endemic Lassa fever, another viral hemorrhagic fever caused by an Old World arenavirus. Yet the...
Geographic Range for Potential Bat Host Species for *Zaire ebolavirus*
Timeline of Ebola Patients within the U.S., 2014

- Patient 1 arrives in Dallas, Texas, from Monrovia, Liberia
- Patient 1 visits emergency department (ED) and is discharged home
- Patient 1 revisits ED and is hospitalized
- Patient 1 is diagnosed with laboratory-confirmed Ebola
- Patient 2 visits ED with fever and is diagnosed with laboratory-confirmed Ebola
- Patient 3 travels from Dallas to Cleveland, Ohio
- Patient 3 visits ED in Dallas with fever and rash and is hospitalized
- Patient 3 is diagnosed with laboratory-confirmed Ebola
- Patient 3 travels back to Dallas from Cleveland
- Of the initial contacts of patient 1, 47 of 48 complete monitoring
- All 177 contacts complete active monitoring

Inadequate Global Governance

Ebola Outbreak in West Africa: Timeline of Events

- **March 21:** Guinea Ministry of Health notifies WHO, WHO declares public alert.
- **March 31:** Liberia reports confirmed EVF case to WHO.
- **April 1:** MSF warns outbreak is “unprecedented.”
- **April 21:** Samples from Sierra Leone and Mali so far all negative.
- **May 26:** WHO announces confirmed case from Kailahun, Sierra Leone.
- **June 7:** Liberia announces first case since April 6.
- **June 17:** Cases in Liberia reach Monrovia.
- **August 2-5:** Two American missionaries infected in Liberia are flown to US.
- **July 2:** Canadians send expert to Sierra Leone.
- **July 16:** CDC teams present in all three countries (12 staff total).
- **August 3:** CDC experts in Nigeria.
- **August 4:** The World Bank announces $200 million in assistance.

**Timeline Details:**
- **January 26:** Facility in Ménangou reports 5 unusual deaths to Ministry of Health in Conakry.
- **February:** Nurse in Guéckédou infected by one of the original Ménangou patients.
- **March 14:** Guinea Ministry of Health reports outbreak of unknown cause to WHO.
- **March 20:** Lab tests confirm Ebola.
- **March 31:** Liberia reports confirmed EVF case to WHO.
- **April 1:** MSF warns outbreak is “unprecedented.”
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**Figure Details:**
- **Guinea**
- **Liberia**
- **Nigeria**
- **Senegal**
- **Sierra Leone**

Figure adapted from WHO situation report, Sept 18, 2014 – [http://apps.who.int/iris/bitstream/10665/133833/1/roadmapsstrap4_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/133833/1/roadmapsstrap4_eng.pdf?ua=1)
Insufficient Ability to Provide Care for the Sick

"Do not lose hope."
"Trust your health care workers. They're there to help you."
Health Worker Ebola Cases in Guinea, Liberia, and Sierra Leone, January 2014 – March 2015

*All cases include health worker and non-health worker confirmed and probable cases.

World Health Organization
apps.who.int/iris/bitstream/10665/171823/1/WHO_EVD_SDS_REPORT_2015.1_eng.pdf?ua=1
Excerpt from an after-action report:

*Federal and state priorities may be unclear, differ, or conflict; authorities may be uncertain; and constitutional issues may arise.*

...tensions rapidly developed between state and federal authorities in several contexts. State leaders wanted control of decisions regarding the imposition of disease-containment measures (e.g., mandatory vs. voluntary isolation ...), the closure of state borders to all traffic and transportation, and when or whether to close airports. Federal officials argued that such issues were best decided on a national basis to ensure consistency and to give the President maximum control of military and public-safety assets.
Dark Winter Exercise (2001):

Federal and state priorities may be unclear, differ, or conflict; authorities may be uncertain; and constitutional issues may arise.

...tensions rapidly developed between state and federal authorities in several contexts. State leaders wanted control of decisions regarding the imposition of disease-containment measures (e.g., mandatory vs. voluntary isolation ...), the closure of state borders to all traffic and transportation, and when or whether to close airports. Federal officials argued that such issues were best decided on a national basis to ensure consistency and to give the President maximum control of military and public-safety assets.
Major Media Coverage

THE WALL STREET JOURNAL.
Travel Restrictions Hamper African Medical Staff in Ebola Fight
By HEIDI VOGT
Updated Oct. 24, 2014 12:44 a.m. ET

HUFF POST POLITICS
Doctors Worry Ebola Quarantines Could Keep Them From Fighting Disease
Posted: 10/27/2014 6:49 pm EDT | Updated: 10/27/2014 7:59 pm EDT
Excerpt from State Ebola Response Plan

There is a large body of scientific literature confirming that asymptomatic individuals are not infectious (cannot transmit the infection to another person). Therefore there is no scientific rational for putting an asymptomatic individual under quarantine. However this practice is done under the guise of “abundance of caution”. The unfortunate consequence is that this approach undermines the message that Ebola can only be transmitted by persons with symptoms and seriously encroaches on the credibility of health officials.
New York City, October 2014

Tuesday Oct. 21 4:30pm
Dr. Spencer stops by Blue Bottle Coffee on the High Line

Tuesday Oct. 21, 5:30pm
He got off the High Line at 34th Street and took the 1 train to the 145th Street station.

Wednesday Oct. 22, 5:30pm
He took the A train from his home to 14th St- 8 Ave subway station and transferred to the L train to Bedford Avenue.

Tuesday Oct. 21, 3pm
Dr. Spencer visited The Meatball Shop, 64 Greenwich Ave.

Wednesday Oct. 22, 1 pm
Dr. Spencer goes on a three-mile run near his Harlem home.

Wednesday Oct. 22, 8:30pm
The doctor and his girlfriend went to The Gutter bowling alley then takes an Uber cab home.

10-11am of Oct. 23:
Dr. Spencer contacts the health department to report that he has a fever and is admitted to Bellevue Hospital.

Moving Forward
Strengthen Surveillance Systems: Texas Health Presbyterian Hospital, Dallas

**Issue: Asking about patient’s travel history**

**Procedure then:** A triage nurse who first interviewed a new ER patient “intentionally did not ask key questions, as travel history was included in the social history.” That was gathered after a patient was “placed in a room.”

**Duncan’s case:** Duncan waited about 1 1/2 hours before he was taken to a room. He then waited another 30 minutes before a different ER nurse asked about travel.

**Procedure now:** A triage nurse asks about travel within “5 minutes of patient entry into the ED in 90% of cases, or within a maximum of 10 minutes.”

**Issue: Documenting travel in the electronic health record system (EHR)**

**Procedure then:** A “yes/no box” in the EHR opened a dialogue screen to document travel history.

**Duncan’s case:** An ER nurse documented in Duncan’s records: “Yes, came from Africa on 9/20/2014.” She “attached no further significance to this travel history,” hospital officials later said. They wouldn’t elaborate on whether Duncan, his companion and the nurse referred in their ER conversation only to “Africa” or more specifically to Liberia.

**Procedure now:** An EHR screening tool was added to “identify patients at risk for serious infectious diseases based on symptoms, travel, and exposure.” Nurses are trained to “be specific about countries the patient has recently traveled to or from.”
Create Global Clinical Response Corps

Ebola: Ending the current outbreak, strengthening global preparedness and ensuring WHO capacity to prepare for and respond to future large-scale outbreaks and emergencies with health consequences

Draft resolution proposed by Algeria, Australia, Bangladesh, Benin, Brazil, Canada, Chile, China, Cuba, Egypt, Georgia, Guinea, India, Indonesia, Israel, Jamaica, Japan, Liberia, Mauritius, Mexico, Monaco, Morocco, Nigeria, Norway, Panama, Peru, Senegal, Sierra Leone, South Africa, Switzerland, Thailand, Togo, United States of America, Uruguay, Zambia, Zimbabwe, and European Union Member States

Perspective

The Next Epidemic — Lessons from Ebola

Bill Gates

The NEW ENGLAND JOURNAL of MEDICINE

www.msf.org/article/ebola-pushed-limit-and-beyond
“Where’s the MERS hospital?”
Promote Evidence-based Policies

CASES OF EBOLA THAT HAVE TURNED UP IN Dallas and New York City have prompted calls for a travel ban to prohibit travelers from Sierra Leone, Liberia, and Guinea from entering the US during the ongoing Ebola outbreak. Prevention (CDC)—have opposed imposing travel bans is that there is no scientific or even good anecdotal evidence that bans have ever been effective at limiting the spread of contagious diseases. A recent modeling analysis showed...
New York City Leaders Meet
Mayor Bill de Blasio, wife Chirlane McCray, and New York City Health Commissioner Dr. Mary Bassett at The Meatball Shop in New York, Saturday, Oct. 25, 2014, where an Ebola patient ate just before he became ill.

<table>
<thead>
<tr>
<th>Monitoring element</th>
<th>Risk category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High risk and some risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Travelers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>U.S. HCWs</td>
<td></td>
</tr>
<tr>
<td>Type of daily monitoring</td>
<td>DAM</td>
<td>AM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DAM</td>
</tr>
<tr>
<td>Reporting frequency to CDC</td>
<td>Daily</td>
<td>Weekly</td>
</tr>
<tr>
<td>No. of persons monitored</td>
<td>315</td>
<td>9,512</td>
</tr>
<tr>
<td>No. of jurisdictions conducting monitoring</td>
<td>47</td>
<td>54</td>
</tr>
</tbody>
</table>

**Abbreviations:** AM = active monitoring; DAM = direct active monitoring; HCWs: Health care workers, including laboratory personnel.

* Adjusted for persons whose risk category changed from some risk to low risk.
## Motivate Health Security Investments

**Global Health Security Agenda (GHSA)**

<table>
<thead>
<tr>
<th>Prevent</th>
<th>Detect</th>
<th>Respond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevent 1: Antimicrobial Resistance</td>
<td>Detect 1: National Laboratory</td>
<td>Respond 1: Emergency Operations Centers</td>
</tr>
<tr>
<td>Prevent 3: Biosafety and Biosecurity</td>
<td>Detect 4: GHSA Reporting</td>
<td>Respond 3: Medical Countermeasures and Personnel Deployment Action Package</td>
</tr>
<tr>
<td>Prevent 4: Immunization</td>
<td>Detect 5: Workforce Development</td>
<td></td>
</tr>
</tbody>
</table>

[www.cdc.gov/globalhealth/security/actionpackages/default.htm](http://www.cdc.gov/globalhealth/security/actionpackages/default.htm)
Strengthen Core Capacities

Contact Tracing Is Called Pivotal in Fighting Ebola

By HEATHER MURPHY  OCT. 2, 2014

Although Ebola is new to the United States, the goal of contact tracing is the same in any disease: Track down those who could have been exposed, interview them and monitor them — in this case, for 21 days, the incubation period of the Ebola virus.

In the United States, it is far more common for contact tracers employed by local and state health departments to investigate measles, sexually transmitted diseases like H.I.V. and gonorrhea, and illnesses that originate with animals, such as rabies.

Ebola: lessons learned from HIV and tuberculosis epidemics

Paul K Drain

Addressing Ebola-related Stigma: Lessons Learned from HIV/AIDS

Mariam Davtyan¹, Brandon Brown¹* and Morenike Oluwatoyin Folayan²

Stigma, Health Disparities, and the 2009 H1N1 Influenza Pandemic: How to Protect Latino Farmworkers in Future Health Emergencies

Monica Schoch-Spana, Nidhi Bouri, Kunal J. Rambhia, and Ann Norwood
Broader Benefits of the GHSA

<table>
<thead>
<tr>
<th>Prevent</th>
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<th>Respond</th>
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<tbody>
<tr>
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<td>Detect 1: National Laboratory</td>
<td>Respond 1: Emergency Operations Centers</td>
</tr>
<tr>
<td>Prevent 2: Zoonotic Disease</td>
<td>Detect 2 &amp; 3: Real time Surveillance</td>
<td>Respond 2: Linking Public Health with Law and Multisectoral Rapid Response</td>
</tr>
<tr>
<td>Prevent 3: Biosafety and Biosecurity</td>
<td>Detect 4: GHSA Reporting</td>
<td>Respond 3: Medical Countermeasures and Personnel Deployment Action Package</td>
</tr>
<tr>
<td>Prevent 4: Immunization</td>
<td>Detect 5: Workforce Development</td>
<td></td>
</tr>
</tbody>
</table>

Areas of potential overlap of GHSA with TB control efforts

www.cdc.gov/globalhealth/security/actionpackages/default.htm
CALL FOR PAPERS

Surveillance and Health Security: Building the New Systems We Need to Detect and Manage Health Threats

A Special Feature in *Health Security* (formerly *Biosecurity and Bioterrorism*)

**TOPIC EDITORS**

Jennifer Nuzzo, DrPH, and Sanjana Ravi, MPH
UPMC Center for Health Security, Baltimore, Maryland

Deadline for article submission: December 31, 2015
Global Health Security: Disease Surveillance and Diagnostic Capacity

CAPT David L. Blazes, MC, USN
Director, Military Tropical Medicine
Navy Medicine Professional Development Center
Disclaimers and Disclosure

- The views expressed in this presentation are those of the author and do not necessarily reflect the official policy or position of the US Navy, US Department of Defense (DoD), nor of the US Government.
- Discussion of non-FDA approved products identified where appropriate.
- No conflicts of interest.
- Content UNCLASSIFIED.
Continuum of Infectious Diseases Research

Identification of Pathogens and Problems
Characterization of Pathogen and Threat
Development Candidate Countermeasures
Testing of Promising Countermeasures
Licensure and Deployment of Countermeasures

Case Reports
Basic Science Studies
Surveillance
Laboratory Investigations
Epidemiological studies
Laboratory Research
Phase I, II, III trials
Threat Assessment
Focused Product Oriented Research
Advanced Development/Licensure
“The mission of the DoD will be expanded to include support of global surveillance, training, research, and response to emerging disease threats”

“... DoD will strengthen it’s global disease reduction efforts through: centralized coordination; improved preventive health programs and epidemiological capabilities; and enhanced involvement with military treatment facilities and overseas laboratories.”
Global Emerging Infections Surveillance and Response System Priorities:
Strategic Goals and Priority Pillars

NSTC-7: “the mission of the DoD will be expanded to include support of global surveillance, training, research, and response to emerging infectious disease threats…”

- Global Health Security
  - Military Health System Quadruple Aim => Readiness; Population Health
  - Global Health Security Agenda: Prevent, Detect, Respond to Global Health Threats

- GEIS Mission
  - To enhance force health protection and global health security by focused coordination and support of global civil and military health networks to prevent, detect, and respond to emerging and priority microbial threats through infectious diseases surveillance, laboratory harmonization, capacity building, and scientific studies.

- GEIS Vision
  - Enhanced national security and force health protection through a global network poised to prevent, detect, and respond to emerging microbial threats.

- GEIS Program
  - Coordination and Collaboration
  - Science and Innovation
  - Responsive Information Sharing
  - Responsible Administration and Management
  - Enhanced national security and force health protection through a global network poised to prevent, detect, and respond to emerging microbial threats.
Foundation For Global Emerging Infections Surveillance and Response System Key Tasks

- PDD NSTC-7, Emerging Infectious Diseases (1997)
- Defense Strategic Guidance (Jan 2012)
- AFHSC Strategic Plan 2013–2015
- DHA Strategic Plan (Pending Release)
- Guidance for Employment of the Force (GEF)
- Joint Operational Access Concept (Oct 2014)
- National Strategy for Combating Antibiotic-Resistant Bacteria (CARB) (Oct 2014)
- National Strategy for Countering Biological Threats (Nov 2009)
- National Strategy for Biosurveillance (Jul 2012)

PDD: Presidential Decision Directive  
AFHSC: Armed Forces Health Surveillance Center  
DHA: Defense Health Agency
Convergence Model

Smolinski et al, Microbial Threats to Health, IOM Report 2003
Surveillance is a Continuous Process
Febrile and Vector-Borne Infections (FVBI)

FVBI Program Goal
- Prevention and control of human FVBI within the context of global health security and US DoD force health protection priorities

FVBI Program Objectives
- FVBI surveillance efforts contribute to the characterization of DoD-relevant FVBI risks and threats while providing timely, relevant, and actionable surveillance data in support of the pillar’s two strategic objectives:
  - Development of accurate disease characterizations and risk assessments for priority and/or novel human FVBI
  - Generation of accurate disease risk maps for militarily relevant geographic areas
Febrile and Vector-Borne Infections (FVBI) Surveillance

Product: FVBI Risk/Threat Characterization through a multi-disciplinary collaborative approach toward FVBI surveillance

Human Infection
Clinical cases
Community morbidity and mortality

Pathogen Presence
Pathogen discovery, Arthropod vector and Animal host harborage

Transmission Facilitation
Environmental and ecologic conditions, trends and events
Surveillance is a Continuous Process

Figure 1: Elements of a Disease Surveillance System

1. Detection
   - Detecting cases of disease in a population and reporting the information

2. Interpretation
   - Analyzing and confirming reported information to detect outbreaks

3. Response
   - Providing timely and appropriate response to disease outbreaks

4. Prevention
   - Providing information to assist in longer-term management of health care policies and programs

Source: GAO analysis
Operation United Assistance Diagnostic Support

- **Phase 1: Ebola diagnostics at 2 locations**
  - Island Clinic, Monrovia
    - Ebola Treatment Unit (ETU) managed by WHO
  - Cuttington University, Bong County
    - ETU managed by International Medical Corps
  - 19 September 2014 – 3 March 2015

- **Phase 2: Molecular diagnosis training and continue Ebola diagnosis at 1 location**
  - Bong County
Ebola Diagnostics

- NMRC ISO production lab at Ft. Detrick produced over 300,000 PCR Ebola diagnostic assays
  - Emergency Use Authorization kits
  - Surveillance kits
  - Deployed to all DoD labs
  - Used by state-based Laboratory Response Network labs
    - All cases in USA were diagnosed initially with NMRC reagents

- Developed lateral flow immunoassay
  - Sensitivity 92%, Specificity 98%
  - OraSure® platform

NMRC: Naval Medical Research Center
ISO: International Organization for Standardization
PCR: Polymerase chain reaction

Surveillance is a Continuous Process

Figure 1: Elements of a Disease Surveillance System

1. Detection: Detecting cases of disease in a population and reporting the information.
2. Interpretation: Analyzing and confirming reported information to detect outbreaks.
4. Prevention: Providing information to assist in long-term management of health care policies and programs.
Completed Phase 1 clinical testing of VSV-EBOV vaccine candidate at WRAIR (USAMRID and DoD Chemical Biological Defense Program); published in NEJM, April 2015

Developed lab tests to support VSV-EBOV Ebola vaccine clinical studies; 2014

HIV vaccine research infrastructure in Uganda leveraged for Ebola studies

- First Ebola vaccine clinical trial in Africa in 2009 (VRC/NIAID); published in The Lancet, December 2014
- Phase 1b clinical trial testing Chimpanzee Adenovirus type 3 vector (ChAd3) vaccines (co-developed by the VRC/NIAID and GlaxoSmithKine®), ongoing
- Largest, long-term follow up study on Ebola survivors from 2007-08 Bundibugyo ebolavirus outbreak; published in Lancet ID, April 2015

In August, 2015 began Phase 2 vaccine study in Nigeria using ChAd3 vaccine (GSK)
Dengue Surveillance in Asia
Cell-Phone Based – SAGES (JHU-APL)
Nota: se muestra las instituciones con más de diez publicaciones, en rojo-naranja las peruanas y en verde las extranjeras. Las líneas muestran el nivel de colaboración entre los nodos. Las líneas grises muestran las relaciones de más de diez publicaciones, en verde las de más de 15, y en azul de más de 20 publicaciones entre instituciones peruanas. El tamaño de los nodos es equivalente al número de publicaciones de la institución.
The International Health Regulations (IHR) were revised in 2005 and are used by countries to prevent and control public health threats while avoiding unnecessary interference with international travel and trade.

All countries are committed to achieving the goals of IHR.
International Health Regulations, 2005

- **Detect:** Ensure surveillance systems and laboratories detect potential threats
- **Assess:** Work together to make decisions about public health emergencies
- **Report:** Report through a global network of National Focal Points
- **Respond:** Respond to public health events
Public Health Threats

Emergence & Spread of New Pathogens
- XDR TB
- MRSA
- Anthrax
- HIV
- Avian Flu
- MERs
- Ebola

Globalization of Travel, Food and Medicines
- Intentional Engineering/Accidental Release
- Rise of Drug Resistance

Declared Public Health Emergencies of International Concern (PHEIC)
- H1N1, 2009
- Reemergence of wild poliovirus, 2014
- West Africa Ebola epidemic, 2014-present
Less Than 1/3 of the World is Prepared to Respond

- By 2012, about 20% of countries (n=42) had met IHR goals
- By 2014, about 30% of countries (n=64) were fully prepared to detect and respond to an outbreak

IHR: International Health Regulations

Report to the Director-General of the Review Committee on Second Extensions for Establishing National Public Health Capacities and on IHR Implementation, November 2014
Why Care About Global Health Security?

PROBLEM

NOT PREPARED
Most countries are not prepared

DISEASES SPREAD
Faster and farther

ECONOMIC IMPACT
SARS: $40 Billion
Ebola: Billions

SARS: Severe acute respiratory syndrome

Global Health Security

“…We must come together to prevent, and detect and fight every kind of biological danger – whether it’s a pandemic like H1N1, a terrorist threat, or a treatable disease.”

President Barack Obama, 2011
Global Health Security Agenda (GHSA)

- A unifying framework to improve our global response to disease outbreaks

Vision: A world safe and secure from global health threats posed by infectious diseases…

- Focused leadership and political will
- 28 countries, WHO, OIE, and FAO
- By September 26, 2014: 44 countries joined the GSHA
- By June 2015, G7 committed to assist at least 60 countries
Seoul Meeting, 7–9 September 2015

Dr. Tom Frieden @DrFriedenCDC - 13h

Joining other public health leaders this week in Seoul to discuss ways to prioritize
#GlobalHealthSecurity Agenda
GHSA: Prevent, Detect, Respond

Prevent avoidable catastrophes

Detect threats early

Respond rapidly and effectively

Action Packages to Achieve Targets

- Antimicrobial Resistance
- Zoonotic Diseases
- Biosafety/Biosecurity
- Immunization
- National Laboratory Systems
- Surveillance
- Reporting
- Workforce Development
- Emergency Operations Centers
- Public Health and Law Enforcement
- Medical Countermeasures

Shared Priorities: GHSA and IHR

GHSA: Global Health Security Agenda
IHR: International Health Regulations

Surveillance
Laboratory
Preparedness
Response
Zoonotic disease
Human resources

Ebola: A Perfect Example of Why GHSA is Needed

- First time in West Africa (first cases notified in March 2014)
- Weak public health infrastructure and spotty border control
- Lack of infection control in health care facilities: absence of protective gloves, soap, and running water
- Unrecognized cases of Ebola reached poor, crowded cities with global air transportation links
Monrovia Under Siege
More Patients than Beds in Ebola Treatment Units

CDC unpublished data
Fear Spreads
Rioting in Monrovia
Ebola Transmission in Nigeria, July–August, 2014

Date of Symptom Onset

Shuaib F, Gunnala R, Musa EO et al; CDC. MMWR Oct 3;63(39):867-72.
Nigeria Responds

- Nigerian FETP and EOC identified 894 contacts
- Completed nearly 19,000 contact tracing visits
- Implemented a social mobilization strategy that reached 26,000 households
- Established an ETU in just two weeks

FEPT: Field Epidemiology Training Program
EOC: Emergency Operations Center
ETU: Ebola Treatment Unit

i.infoplease.com/images/mnigeria.gif
Nigeria Succeeds

Ebola-free Nigeria hailed as 'success story' in battling outbreak

With only two GHSA features in place (contact tracing and surveillance, Emergency Operations Center), Nigeria was able to contain a potentially disastrous epidemic

Obama Meets with CDC
Treatment for Healthcare Workers
GET 2 zero
Emergency Funding, 2015–2019

CDC received $1.77B of $6B

- **International Ebola Response**: $603M
- **Global Health Security**: $597M
- **U.S. Domestic Preparedness**: $571M

CDC, stacks.cdc.gov/view/cdc/27784
U.S. Global Health Security Agenda Commitments, 2015

17 Phase 1 Countries

GHS
- Bangladesh
- Cameroon
- Ethiopia
- India
- Indonesia
- Kenya
- Pakistan
- Tanzania
- Uganda
- Vietnam

Ebola-affected countries
- Guinea
- Liberia
- Sierra Leone

High Risk Non-Affected Ebola Funded Countries
- Burkina Faso
- Cote d’Ivoire
- Mali
- Senegal

GHS: Global Health Security
Next Steps

- **2015**
  - Get to Zero, Stay at Zero, Build Back Better

- **Next 3–5 years**
  - Expand GHSA footprint to other at risk countries

- **By 2020**
  - United States to implement GHSA in 30 countries
Global Health Security Agenda

“Together, our countries have made over 100 commitments… And now, we’ve got to turn those commitments into concrete action – starting in West Africa. We’ve got to make sure we never see a tragedy on this scale again…”

President Barack Obama
September 26, 2014

CDC reported on 140 outbreaks in 107 countries March 2014–July 2015

Countries with infections disease outbreaks from March 2014 to July 2015 as reported by CDC Global Disease Detection (GDD) Operations Center

Ebola-affected countries
Global Health Security Agenda

3 Risks
- Emerging organisms
- Drug resistance
- Intentional creation

3 Opportunities
- Public health framework
- New lab and surveillance tools
- Successful outbreak control

3 Priorities
- Prevent wherever possible
- Detect rapidly
- Respond effectively