Are We Ready?
A Discussion of Disaster Epidemiology and Preparedness for Infectious Disease Surveillance During Major Emergencies in the United States

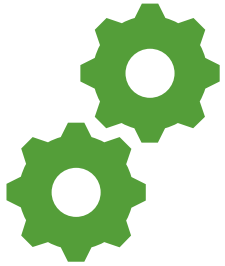
Emily Laskowski, MPH

Agenda

- About surveillance and disaster epidemiology
- Disaster surveillance capabilities and frameworks
- Disaster surveillance capacity assessments
- Research and findings
- Discussion

Surveillance and Disaster Epidemiology

What is Public Health Surveillance?



Definition

The ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control

Goal

Provide information that can be used for health action by public health personnel, government leaders, and the public to guide public health policy and programs

https://www.cdc.gov/training-publichealth101/media/pdfs/introduction-to-surveillance.pdf
Smith PF, Hadler JL, Stanbury M, et al. Blueprint version 2.0: updating public health surveillance for the 21st century. J Public Health Manag Pract 2013;19:231–9

What is Disaster Epidemiology?

Definition

The use of epidemiology to investigate the short and long-term health effects of disasters and to predict the health consequences of future disasters

Goals

Identify the most urgent needs of affected populations

Provide timely, accurate, and relevant information to drive decisions and interventions

Track and redefine public health problems as incidents progress

https://www.cdc.gov/disaster-epidemiology-and-response/media/pdfs/Disaster_Surveillance_508.pdf

Disaster Surveillance Objectives

- Define and detect outbreaks and health problems early
- Determine when, where, and how injuries, illnesses, and deaths occur
- Prepare for and prevent ongoing adverse health effects
- Estimate the magnitude of a health problem
- Identify at-risk groups or geographic areas
- Demonstrate the need for public health intervention or resources
- Inform and monitor the effectiveness of response and relief efforts
- Assist with planning for future disasters and recommend ways to decrease the consequences of future disasters

https://www.cdc.gov/disaster-epidemiology-and-response/media/pdfs/Disaster_Surveillance_508.pdf

Surveillance System Types and Data Sources

Surveillance System Types

- Case-based or indicator-based surveillance
- **Event-based surveillance**
- **Syndromic surveillance**
- Population-based surveillance
- Sentinel surveillance

Possible Data Sources

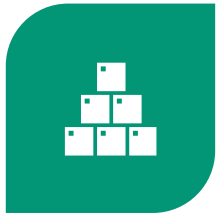
- Health care provider reports
- Laboratory reports
- Vital records
- Medical records
- Discharge records
- Surveys
- Environmental sources
- Community/crowd-sourcing
- Non-traditional data sources

https://www.cdc.gov/training-publichealth101/media/pdfs/introduction-to-surveillance.pdf

Surveillance System Resource Requirements

SOFTWARE

EQUIPMENT



MATERIALS

ELECTRICITY

CONNECTIVITY

TRANSPORTATION

SPACES

STAFF

FUNDING

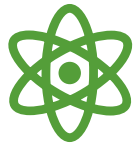
Why Disaster Infectious Disease Surveillance?

Climate change and increasingly impactful meteorological events

Global interconnectivity and greater likelihood of infectious disease outbreaks

Decreasing protection from infectious disease outbreaks

Unlikely, but potentially catastrophic emergencies

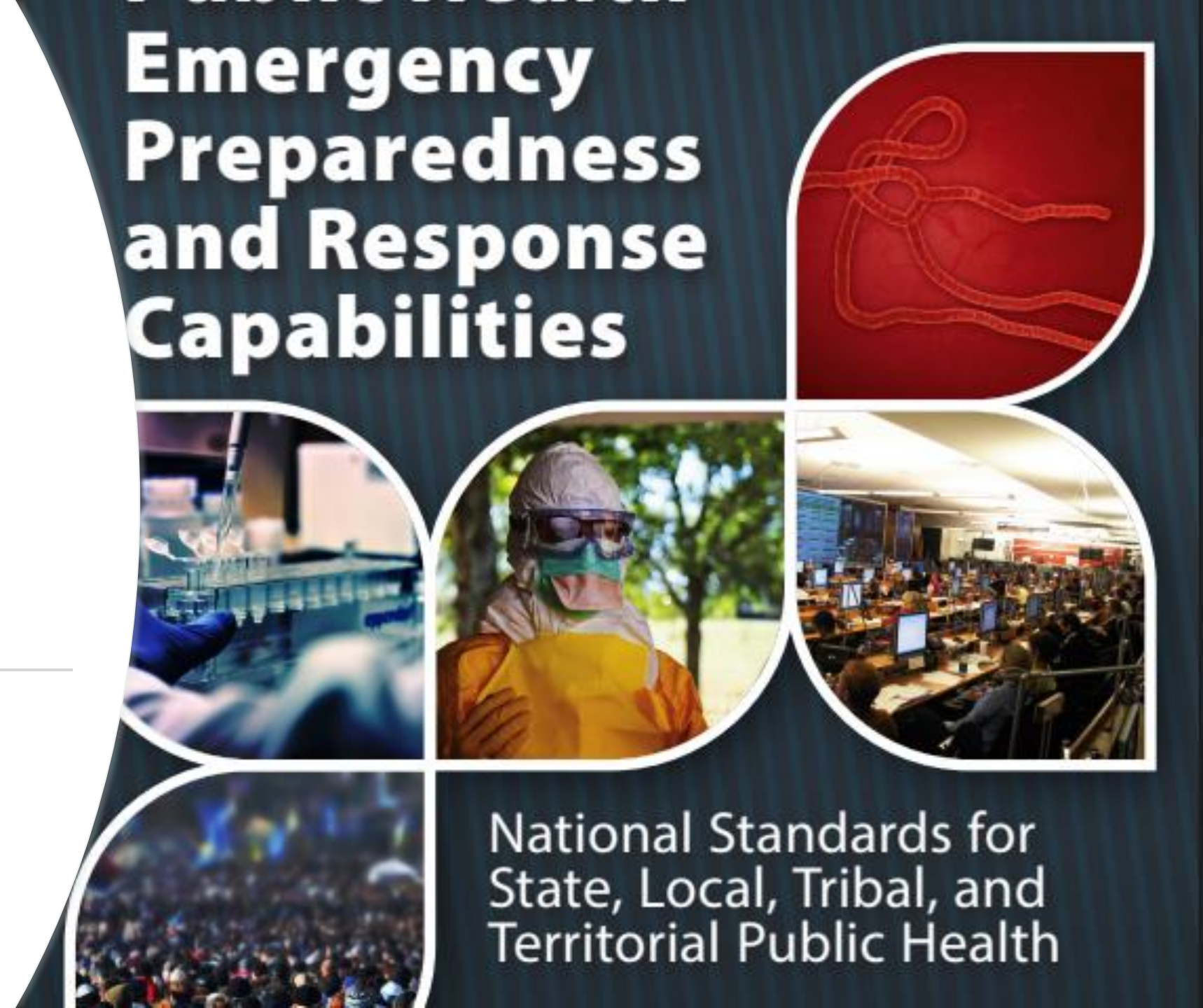


Uncertain availability of finite resources

Disaster Surveillance Frameworks

Domestic and International

PHEP Capabilities



PHEP Capabilities

1. Community preparedness
2. Community recovery
3. Emergency operations coordination
4. Emergency public information and warning
5. Fatality management
6. Information sharing
7. Mass care
8. Medical countermeasure dispensing and administration
9. Medical materiel management and distribution
10. Medical surge
11. Nonpharmaceutical interventions
12. Public health laboratory testing
13. Public health surveillance and epidemiological investigation
14. Responder safety and health
15. Volunteer management

https://www.cdc.gov/orr/readiness/capabilities/index.htm

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https://cdn.ymaws.com/www.cste.org/resource/resmgr/PDFs/Crosswalk_5.28.15.pdf

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PHEP Capabilities: Capability 13

Definition:

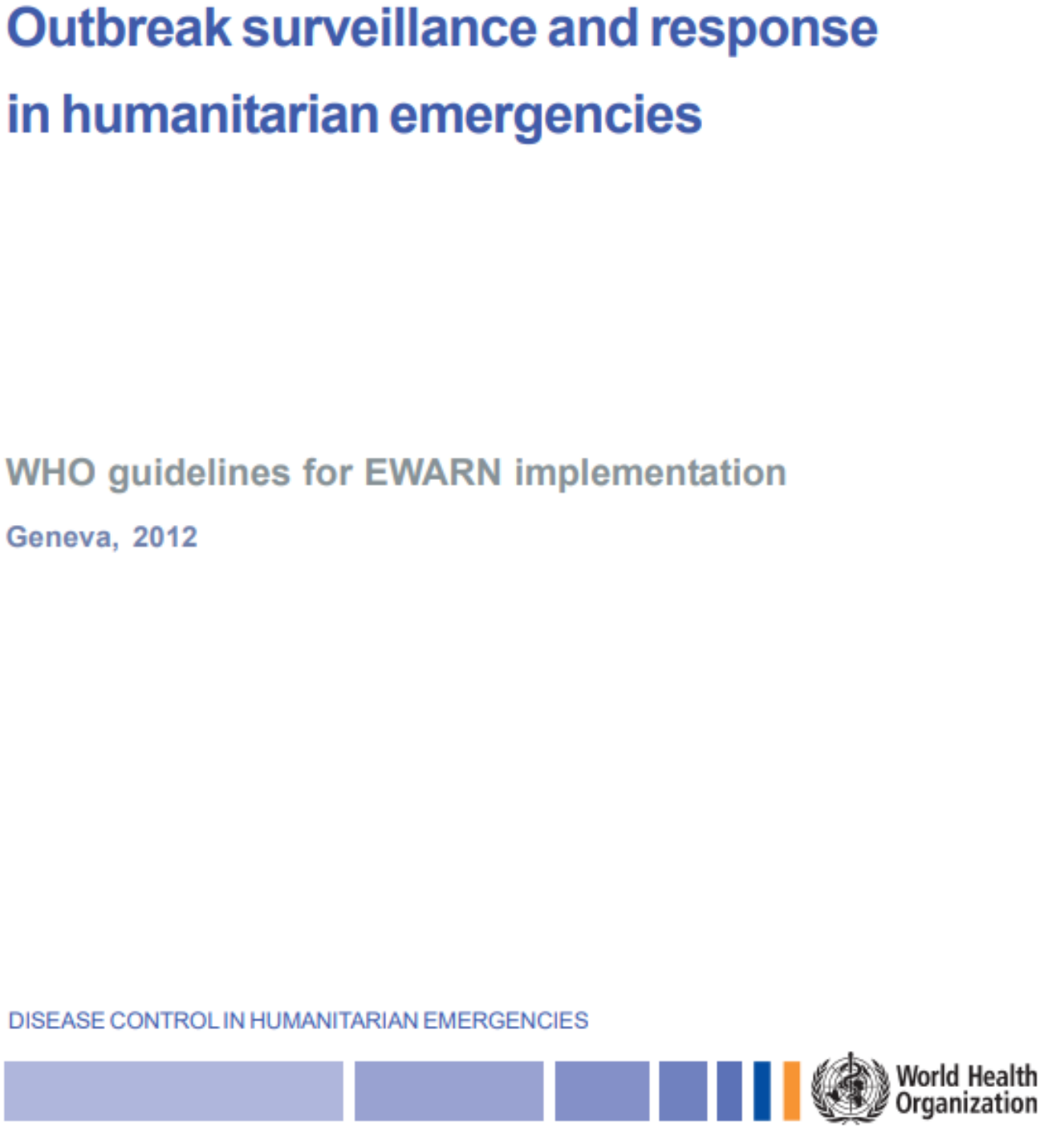
The ability to create, maintain, support, and strengthen routine surveillance and detection systems and epidemiological investigation processes. It also includes the ability to expand these systems and processes in response to incidents of public health significance

Functions:

1. Conduct or support public health surveillance
2. Conduct public health and epidemiological investigations
3. Recommend, monitor, and analyze mitigation actions
4. Improve public health surveillance and epidemiological investigation systems

https://www.cdc.gov/orr/readiness/capabilities/index.htm

WHO EWARN



https://iris.who.int/bitstream/handle/10665/70812/WHO_HSE_GAR_DCE_2012_1_eng.pdf?sequence=1&isAllowed=y

EWARN Key Concepts

- Management structure
- Surveillance network
- Priority diseases
- Data collection
- Data reporting and transmission
- Outbreak preparedness planning
- Verification of outbreaks
- Investigation
- Lab support
- Data analysis and interpretation
- Feedback and dissemination
- EWARN set-up
- Training
- Monitoring and supervision
- Exit strategy

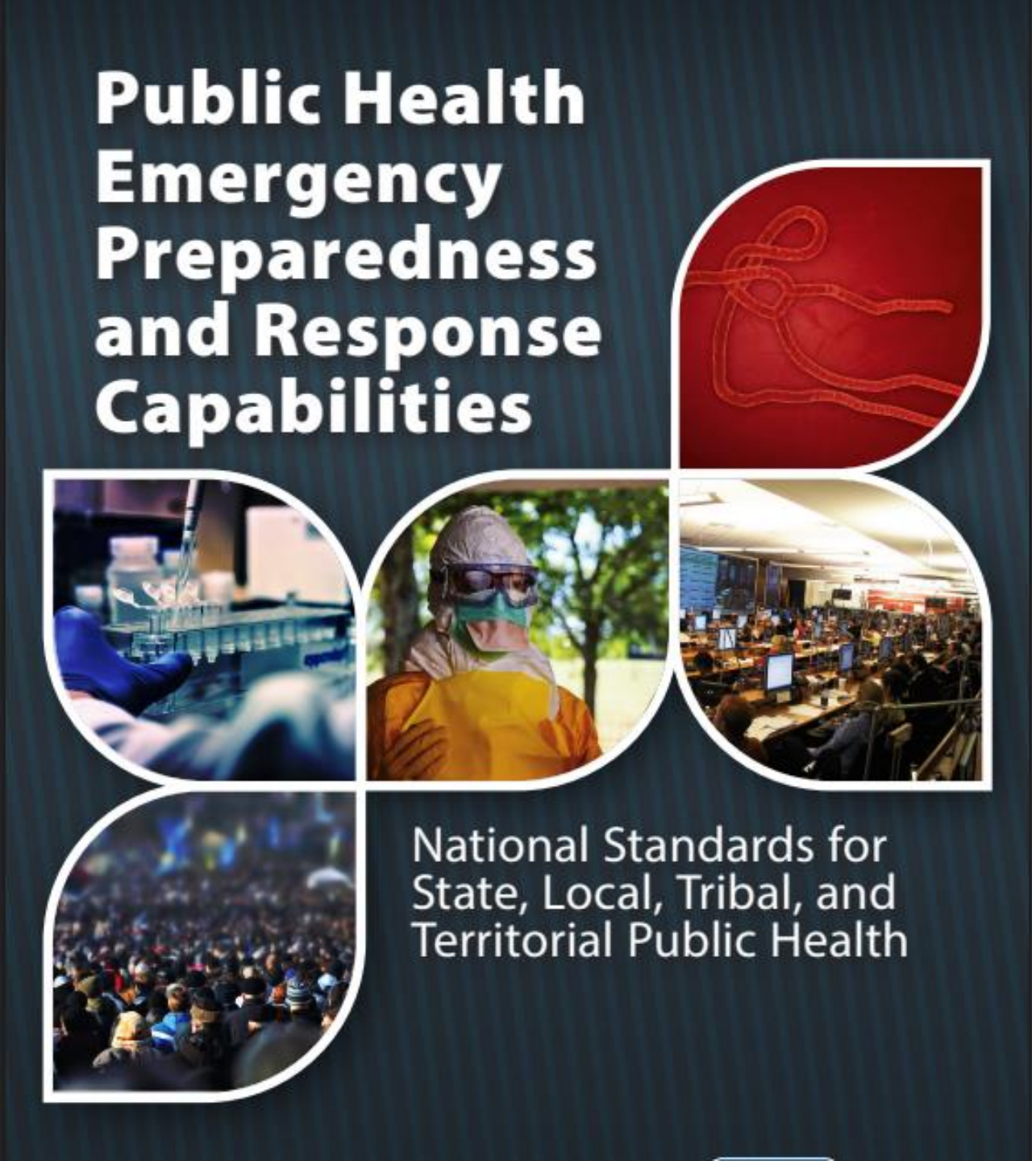
PHEP vs. EWARN

Similarities

- Key disaster surveillance tasks
- Clear reporting structure and hierarchy of responsibilities
- Emphasis on staff training and preparedness
- Focus on simplicity and speed
- Use of existing surveillance systems

Differences

- Approaches to surveillance for certain diseases and conditions
- Logistics for critical surveillance functions
- Focus on system functionality despite lack of resources
- Plans for surveillance outside of healthcare or shelter settings



Outbreak surveillance and response in humanitarian emergencies

WHO guidelines for EWARN implementation

Geneva, 2012

DISEASE CONTROL IN HUMANITARIAN EMERGENCIES

World Health Organization

Key Preparedness Priorities for Surveillance During Major Emergencies

- Inclusion of surveillance in emergency response planning
- Inclusion of surveillance in drills and exercises
- Collaboration with internal and external partners
- Identifying and training surge staff
- Developing procedures for data collection and needs assessments
- Identifying strategies for communications and case reporting
- Establishing thresholds and strategies for outbreak investigation and response
- Ensuring availability of critical supplies and resources
- Emphasis on evaluation and after-action reporting

Disaster Surveillance Capacity Assessments

Disaster Surveillance Assessments

- 2012 CSTE Disaster Surveillance Capacity Assessment
  - Disaster surveillance personnel
  - Past disaster surveillance experience
  - Other disaster epidemiological activities
  - Disaster surveillance plans and exercises
  - Lessons learned

https://dhhr.wv.gov/healthprep/programs/epidemiology/Documents/2012%20CSTE%20Assessment.pdf

CSTE Assessment Key Findings and Recommendations

- Maintain formal disaster surveillance plans
- Exercise disaster surveillance plans
- Conduct after action reviews
- Establish partners and data-sharing agreements pre-disaster
- Have goals for data collection
- Use simple and adaptable data collection protocols
- Identify additional resources and trained and exercised personnel

Research and Findings

Study Overview

Purpose: Understand the current preparedness and operational readiness of US health agencies to conduct infectious disease surveillance during major emergencies

Goal: Identify successes, challenges, uncertainties, and areas for improvement in disaster infectious disease surveillance preparedness and operational readiness at all levels of government in the US

Methods

- **Research type:** Qualitative, semi-structured key informant interviews
- **Participants:** 11 Infectious disease epidemiologists and public health emergency managers
- **Sampling strategy:** Snowball sampling, goal of geographic representation
- **Time and location**: 60-minutes and virtual
- **Data collection:** Interviews recorded, transcribed, de-identified, and reviewed for accuracy
- **Review:** IRB-approved
  - CUIMC IRB: IRB-AAAU9944 (Y01M00)
  - Exemption Date: 01/11/2024

Qualitative Interview Guide Development

- Frameworks:
  - CDC Public Health Emergency Preparedness (PHEP) Capability 13
  - WHO Early Warning, Alert, and Response Network (EWARN) guidelines
  - 2012 CSTE Disaster Surveillance Capacity Assessment
- Information collected
  - Successes and challenges of surveillance during past emergencies
  - Emergency response plans
  - Emergency drills and exercises
  - Collaboration with internal and external partners
  - Surge staffing and staff training
  - Data collection and needs assessments
  - Communications and case reporting
  - Outbreak investigation and response
  - Supply and resource preparedness
  - Recommendations for future priorities

	Uncertainty	Challenge	Success	Recommendation
Analysis	5	15	10	1
Case Definition	7	6	6	1
Collaboration	16	35	33	7
Communications & Case Reporting	40	41	20	6
Coordination	18	31	27	5
Data Collection	27	42	18	8
Drills and Exercises	7	14	15	2
Emergency Response Plan	36	31	15	7
Example	8	8	13	0
Funding	0	11	4	6
Needs Assessment	8	5	4	0
Outbreak Investigation/Response	25	37	32	5
Reliance on Partners	26	23	10	4
Staffing	14	45	19	13
Supplies/Resources	17	12	8	2
Surveillance Systems	15	29	14	6
Training	8	22	9	6
Work Location	5	6	5	0

Results

- Emergency response plans and exercises
- Surge staffing capacity and training
- Data collection tools and communications
- Coordination and collaboration with partners

CSTE Assessment Key Findings

- **Maintain formal disaster surveillance plans**
- Exercise disaster surveillance plans
- Conduct after action reviews
- Have goals for data collection
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- Identify additional resources and trained and exercised personnel

Surveillance in Response Plans

- Health agencies have emergency response plans which touch on surveillance, but epidemiologists may not regularly participate in developing plans
- There is uncertainty about response plan contents, who is familiar with plans, when plans had last been updated, and if epidemiologists had provided input
- Emergency response plans are considered important, but may not be as helpful as other preparedness activities

Response Plans: Key Takeaway

Key Takeaway

Though agencies have response plans which touch on surveillance, information on surveillance may be limited and is not often a part of a formal disaster surveillance plans. Epidemiologists may have limited familiarity with plan contents and may not be heavily involved in plan development or updates

Recommendation(s)

- Epidemiologists and emergency preparedness staff should collaborate to create formal disaster surveillance response plans
- Epidemiologists should be familiarized with response plans

CSTE Assessment Key Findings

- Maintain formal disaster surveillance plans
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Drills and Exercises

- Interviewees have participated in an emergency drill or exercise at least once, but not since the pandemic
- Exercises tended to include an element of infectious disease surveillance, though minimal
- Exercises helped staff work through issues in advance, enabled staff to know their ICS roles, and enhanced collaboration
- Exercises may be limited in their effectiveness due to staff turnover, quickly outdated materials, time constraints, and lack of focus on epidemiological functions
- Recent emergency responses have often fulfilled the role of exercises in preparing staff

Drills and Exercises: Key Takeaway

Key Takeaway

Most epidemiologists had participated in a drill or exercise at least once and find them helpful, but surveillance-specific activities and injects are rarely a focus.

Recommendation(s)

- Jointly identify areas of improvement for disaster surveillance capacity and incorporate these into targeted disaster surveillance drills and exercises

CSTE Assessment Key Findings

- Maintain formal disaster surveillance plans
- Exercise disaster surveillance plans
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- **Establish partners and data-sharing agreements pre-disaster**
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Internal and External Collaboration

- Strong pre-existing relationships will be an asset during emergencies, but few have discussed disaster surveillance preparedness with partners
- Collaboration with groups like Medical Reserve Corps (MRCs) or University Students were a source of surge support for data collection and outbreak response
- Silos between epidemiologists and emergency managers hinder internal collaboration
- Politics, inflexible data-sharing agreements, and limited capacity hinder collaboration between local, state, and federal agencies

Collaboration: Key Takeaway 1

Key Takeaway

Health agencies have strong relationships with external partners but have not engaged with them on the topic of disaster surveillance

Recommendation(s)

- Conduct focused disaster surveillance planning and exercises with external partners

Collaboration: Key Takeaway 2

Key Takeaway

Within government, politics, lack of collaboration, and inflexible data sharing agreements remain a hindrance during emergencies

Recommendation(s)

- Develop standing data use agreements which enable more streamlined data sharing and collaboration during emergencies
- Seek opportunities to collaborate internally and across government agencies

CSTE Assessment Key Findings

- Maintain formal disaster surveillance plans
- Exercise disaster surveillance plans
- Conduct after action reviews
- Establish partners and data-sharing agreements pre-disaster
- **Have goals for data collection**
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Data Collection: Sources and Tools

- Even when no data infrastructure has been disrupted, the volume of data during emergencies can be difficult to manage
- Despite data modernization efforts after COVID, the technology needed to process large amounts of data continues to lag
- Outdated and inflexible data-sharing agreements hinders data management during emergencies

Data Collection: Communications

- Surveillance systems are largely dependent on electricity, internet or network access, and functioning communications.
- Participants were unsure how they would communicate or how data would be collected, reported, or disseminated if the internet, phone lines, or other systems reliant on electricity lose functionality
- Most participants do not have tools or procedures for these scenarios pre-identified, and staff are not typically trained on emergency communications or data collection procedures in advance of incidents

Data Collection: Needs Assessments

- Data collection on needs in the community was an area of uncertainty
- Most participants had heard of CASPERs, but only a few had experience with them
- Some agencies may use ad-hoc community surveys and key informant interviews
- Participants were not generally involved in planning for needs assessments
- Most participants have not collaborated with internal or external partners around needs assessments or data collection

Data Collection: Key Takeaway 1

Key Takeaway

Agencies are increasingly reliant on virtual data systems and do not consistently have tools or procedures to collect data if these systems are disrupted

Recommendation(s)

- Assess availably of tools and procedures which are not reliant on electricity or communications, and develop as needed
- Coordinate with partners about data collection in scenarios where all or most forms of communication and data transfer are interrupted

Data Collection: Key Takeaway 2

Key Takeaway

Agencies do not consistently have strategies to identify cases circulating in the community when healthcare facilities, laboratories, and shelters are overwhelmed or inaccessible. Epidemiologists may also not be involved in planning for data collection through rapid needs assessments

Recommendation(s)

- Ensure infectious disease epidemiology staff participate in planning for community needs assessments
- Consider community-based surveillance strategies

CSTE Assessment Key Findings

- Maintain formal disaster surveillance plans
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- **Identify additional resources and trained and exercised personnel**

Surge Staffing and Training

- Insufficient funding and staffing capacity leaves little time and space to prioritize preparedness
- Health departments with high staff turnover lose critical emergency response experience
- Extremely technical skillsets required for surveillance as well as resource and time-intensive training for surveillance systems makes incorporating surge staff for epidemiology very difficult
- Cross-training could be beneficial, but has little buy-in
- Some may have just-in-time training materials, but most do not or were unsure

Surge Staffing and Training: Key Takeaway 1

Key Takeaway

Agencies have limited trained surge staff to support surveillance during emergencies

Recommendation(s)

- Develop just in time training materials for data collection and analysis
- Ensure staff have personal emergency plans
- Define thresholds for redeploying internal staff
- Have agency-wide catalogues of staff skills, expertise, and completed trainings
- Partner with volunteers and students

Surge Staffing and Training: Key Takeaway 2

Key Takeaway

Systemic changes in funding, workforce development, and workforce retention strategies will be necessary to ensure adequate disaster surveillance capacity

Recommendation(s)

- Prioritize agency stability and efforts to reduce staff turnover
- Advocate for benefits which draw in new MPH graduates and retain current staff
- Advocate for consistent funding for public health

CSTE Assessment Key Findings

- **Maintain formal disaster surveillance plans**
- **Exercise disaster surveillance plans**
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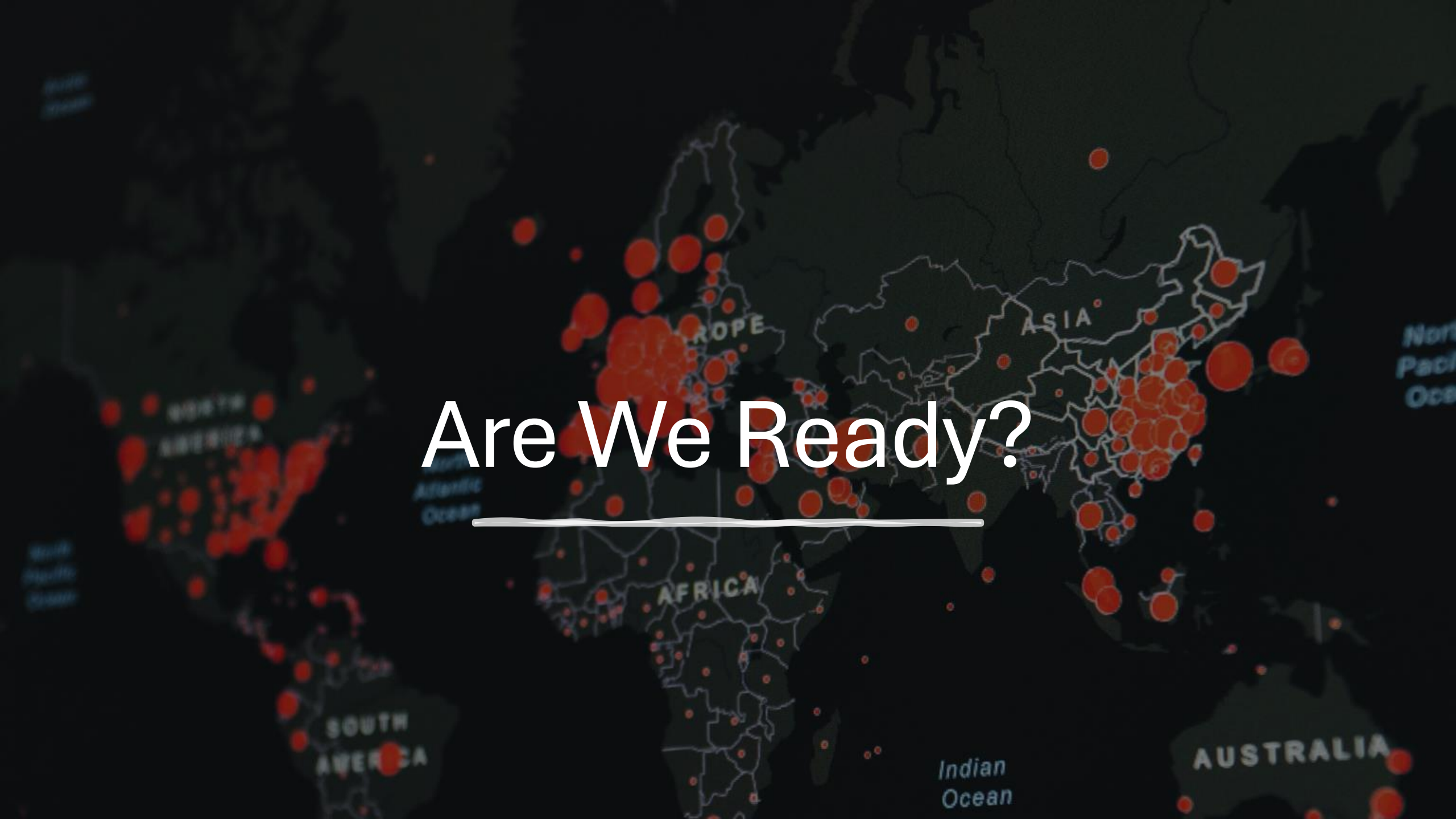
Overall

Key Takeaway

There was significant uncertainty about disaster surveillance when electricity, internet, phone lines, healthcare facilities, or transportation is interrupted, or when there is competition for finite resources

Recommendation(s)

- Conduct assessments of disaster surveillance capacity and develop improvement action plans



Are We Ready?

Discussion

- Do any of these findings particularly surprise you or not surprise you?
- What findings or recommendations do you feel will be most useful or actionable?
- Do you have any other insights or recommendations you feel could add to this research?
- What are some examples of successes in collaboration between epidemiologists and emergency managers you have seen?

Thank you!

Emily Laskowski, MPH
eml2236@caa.columbia.edu