TRACIE

HEALTHCARE EMERGENCY PREPAREDNESS INFORMATION GATEWAY

Information Sharing Topic Collection 5/5/2017

ASPR

ASSISTANT SECRETARY FOR PREPAREDNESS AND RESPONSE

Topic Collection: Information Sharing

The timely and effective sharing of information within and across jurisdictions, disciplines, and organizations is critical to an effective public health emergency and disaster response. Much progress has been made since 9/11, and best practices indicate that those communities with solid, daily, consistent public health and homeland security collaborations respond better to critical incidents. These resources highlight guidance and lessons learned on information sharing that can help emergency health planners identify stakeholders to incorporate into the information flow, develop rules and elements for sharing, and exchange information to ensure a common operating picture. This Topic Collection concentrates on the information shared, and not on the actual "hardware" or physical elements of the information sharing systems.

Planners may also wish to access several other related ASPR TRACIE Topic Collections for more information. The Communications Systems Topic Collection emphasizes the physical aspects of communications systems including promising practices, reports, evaluations, and overviews of programs focused on creating and maintaining resilient emergency communication systems. The Cybersecurity Topic Collection can help stakeholders better protect against, mitigate, respond to, and recover from cyber threats, ensuring patient safety and operational continuity. Emergency Public Information and Warning/Risk Communications includes lessons learned; education and training modules; results from studies conducted on the effectiveness of risk communications; and plans, tools, and templates that can be tailored to meet the specific threats and needs of healthcare and medical professionals.

Each resource in this Topic Collection is placed into one or more of the following categories (click on the category name to be taken directly to that set of resources). Resources marked with an asterisk (*) appear in more than one category.

Must Reads

Association of State and Territorial Health Officials. (2013). Public Health and Information Sharing Toolkit: Legal Barriers Project.

This toolkit includes links to resources that focus public health agencies' authority to collect, use, and share information to prepare for and respond to a public health

emergency. Resources include “executive overviews,” fact sheets, issue briefs, state analysis guides, and supplemental resources.

Booth, C. and Stewart, T. (2003). Communication in the Toronto Critical Care Community: Important Lessons Learned During SARS. Critical Care. 7(6): 405–406.

The authors describe information sharing during the critical care response to SARS. Some of the initiatives that helped the healthcare community exchange information include regular teleconference calls, web-based training and education, and the rapid coordination of research studies.

Centers for Disease Control and Prevention. (2017). Division of Health Informatics and Surveillance.

This website contains links to disease surveillance programs, information systems, and other related resources. Links to recent messages are included on this website as is a legend that explains types of messages disseminated by the system (alerts, advisories, updates, and general information).

Centers for Disease Control and Prevention. (2017). Health Alert Network.

The Centers for Disease Control and Prevention use this network to share cleared information about pressing public health incidents with public health professionals.

Crowther, K. (2014). Understanding and Overcoming Information Sharing Failures. Journal of Homeland Security and Emergency Management. 11(1): 131-154.

The author reviewed the common information sharing failures that caused or exacerbated major catastrophes – the attack on Pearl Harbor, the 9/11 terrorist attacks, and Hurricane Katrina. His analysis revealed several categories of failure: partnering, communication, synthesis and decision-making, and awareness. Suggestions for future research and improvements are included.

Henry, D. (2012). Improving Preparedness Through Sharing Public Health and Homeland Security Information. National Governor's Association.

The author describes: the role of the governor's office in supporting information sharing, how states can build a "culture of preparedness," how fusion centers can support information exchange, and how cross-agency partnerships can bolster intelligence.

Institute of Medicine of the National Academies. (2014). Regional Disaster Response Coordination to Support Health Outcomes: Information Sharing and Incident Management— Workshop in Brief.

Workshop participants noted several essential elements of disaster information sharing: reliable systems that can be used by all involved during an incident; improved

coordination between agencies and entities that would lead to better public messaging; the use of Scientific Response Units, which would provide an avenue for experts to contribute their knowledge to specific types of incidents; and identifying and using the right "amplifiers" for messages. Case studies from recent events are included.

Institute of Medicine of the National Academies. (2015). Regional Disaster Response Coordination to Support Health Outcomes: Community Engagement and Information Sharing — Workshop in Brief.

Workshop participants noted several essential elements of disaster information sharing, including: patient tracking and evacuation; hospital surge with those not acutely ill; and coordination of the expansion of focused task forces, organizations, and coalitions involved in disaster response. Case studies from recent events are included.

Link, P., Brannman, P. S., Murphy, M., et al. (2013). Hospital Preparedness Program (HPP) Healthcare Preparedness Capability Review National Call: Capability 6: Information Sharing. U.S. Department of Health and Human Services, Office of the Assistant Secretary of Preparedness and Response.

This document contains notes from a national call conducted in August 2013 on Capability 6, Information Sharing. While this document does not track with current capabilities, it does contain valuable information sharing data. National Healthcare Preparedness Program (NHPP) Awardees (Oklahoma, New Mexico, Kentucky, District of Columbia, Maryland, and Michigan) gave presentations on real world examples related to various information sharing experiences, which are also captured in this document.

National Information Sharing Consortium. (2015). Essential Elements of Information Publication Guidance for Emergency Management Officials.

This guide, geared towards emergency management officials, highlights an agreed-upon definition of the information sharing components necessary for successful cross-jurisdictional information sharing. The three sections include an executive summary, a description of the Essential Elements of Information (EEI) design process, and Standard Operating Procedure Annex Templates that can be tailored as needed.

Region IV Public Health Training Center Network. (2015). The PHTC Network's Collective Role in Helping the Public Health Workforce Prepare for and Respond to Infectious Diseases: What We've Learned from Ebola.

This webinar is approximately 1.5 hours and includes presentations on: the practice and roles of health departments in preventing and controlling infectious diseases; public health information sharing during a public health event; priority knowledge, skills, and abilities (KSAs) needed by the public health workforce to prepare for and respond to infectious diseases; and additional information from national partners.

RTI International. (2012). ONC State Health Policy Consortium Project: Health Information Exchange in Disaster Preparedness and Response.

The authors conducted a literature scan and conducted legal and technical workshops to determine the requirements necessary to enable interstate data exchange following a disaster. The report suggests that the best way to ensure that health information can be easily accessed during a disaster is to ensure that this can happen every day and during more common emergencies.

U.S. Department of Health and Human Services. (2014). Appendix B: Essential Elements of Information. HHS Disaster Human Services Concept of Operations.

This appendix lists the essential elements of information related to a public health emergency or disaster response and the associated data source or agency.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2014). HPP-PHEP 6.1: Information Sharing.

This list of Essential Elements of Information (EEI) can be used as a guide for emergency medical planners and responders. It asks for information regarding: the number of partners that reported requested EEI (which can be divided by the number that reported it); the type of exercise, event, or incident; the type and number of local partners that responded to the request; types of EEI requested; type of communication system used to make the request; and other related components. While this document does not track with current capabilities, it does contain valuable information sharing information.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2016). 2017-2022 Health Care Preparedness and Response Capabilities.

The guidance specific to these capabilities highlights what healthcare delivery system (e.g., hospitals, healthcare coalitions, and emergency medical services) have to do to effectively prepare for and respond to emergencies that impact the public's health. Objective 2 (Information Sharing) under Capability 2 (Health Care and Medical Response Coordination) includes three activities and related guidance: develop information sharing procedures; identify information access and data protection procedures; and utilize communications systems and platforms.

Preparedness and Response. (2016). ASPR Fusion Tools.

This webpage contains links to the Fusion Analytics Dashboard, GeoHEALTH, and "Fusion Forums." These tools can help with decision making and tactical changes during a response, as they provide visibility on electronic medical record data and other factors. The page also includes a link to "Fusion Forums," where the public health emergency community discusses emerging technologies and trends in situational awareness and rapid decision support.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2016). ASPR Fusion Tools: GeoHEALTH Platform.

GeoHEALTH is a web-based, Geographic Information System that allows users to view and analyze health, environmental, population and economic data in a geospatial environment to better contextualize an area of concern or interest. ASPR/OEM Fusion staff developed and maintains the system and its internal HHS data, and ensures that connectivity to external data is consistent and accurate. This system is open to the public for some data. Data that has any type of restriction requires an account that is created and maintained by HHS ASPR/OEM staff.

U.S. Department of Homeland Security. (2014). National Emergency Communications Plan: 2014.

This strategic national emergency communications plan encourages communication and information sharing across all levels of government, jurisdictions, specialties, and agencies and organizations for all types of threats and hazards ("as needed and when authorized").

U.S. Department of Homeland Security. (2017). Homeland Security Information Network.

This network, referred to as “HSIN,” allows federal, state, local, territorial, tribal, international, and public sector partners in emergency services, intelligence, law enforcement, and other fields to share Sensitive but Unclassified information through an invitational password-protected system.

U.S. Department of Justice. (2015). Joint Criminal and Epidemiological Investigations Handbook: 2015 Domestic Edition.

The authors highlight common concerns shared by law enforcement and public health: early identification of an outbreak, whether outbreak is naturally occurring or intentional, and protection of the public. The handbook highlights components of both fields and how they interact and complement each other; discusses investigational procedures and methodologies for a response to a biological threat; identifies challenges and solutions for improved information sharing (p. 55-60); and provides templates that can be replicated or customized.

U.S. Department of Justice’s Global Justice Information Sharing Initiative. (2011). Health Security: Public Health and Medical Integration for Fusion Centers (An Appendix to the Baseline Capabilities for State and Major Urban Area Fusion Centers).

This guidance document encourages the integration of public health and medical providers into fusion center activity. Guidance is provided by fusion center capabilities and by management and administrative capabilities.

Education and Training

Federal Emergency Management Agency. (2013). IS-662: Improving Preparedness and Resilience through Public-Private Partnerships.

One of the four objectives of this interactive, web-based course is to "describe methods for sharing resources among partners." The rest of the course focuses on establishing and sustaining public-private partnerships.

Federal Emergency Management Agency. (2016). IS-64.A: DHS Common Operating Picture Application.

This interactive, web-based course provides an overview of the Common Operating Picture application, describes how to access and navigate it, and highlights how it can be used to improve decision-making capabilities.

U.S. Department of Health and Human Services, National Institutes of Health, National Library of Medicine. (n.d.). Disaster Health Information Sources: The Basics. (Accessed 4/28/2017.)

This entry-level, self-paced course provides an overview of sources and categories of health information and specific disaster applications. Specific content includes monitoring disaster literature, open-source searches, disaster roles and responsibilities, particularly for information specialists. Resources include downloadable references and PowerPoint presentations.

Essential Elements of Information

* National Information Sharing Consortium. (2015). Essential Elements of Information Publication Guidance for Emergency Management Officials.

This guide, geared towards emergency management officials, highlights an agreed-upon definition of the information sharing components necessary for successful cross-jurisdictional information sharing. The three sections include an executive summary, a description of the Essential Elements of Information (EEI) design process, and Standard Operating Procedure Annex Templates that can be tailored as needed.

*U.S. Department of Health and Human Services. (2014). Appendix B: Essential Elements of Information. HHS Disaster Human Services Concept of Operations.

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* U.S. Department of Homeland Security. (n.d.). Draft Guidelines for Publishing and Sharing Information. (Accessed 5/4/2017.)

This report—while slightly dated—highlights Capstone 2014, an exercise conducted to develop, codify, and share a set of Essential Elements of Information (EEI; Table 1). Guidance for sharing information through various means (e.g., incident management information systems, geospatial tools) is also included.

Guidance

ESRI. (2008). Public Safety and Homeland Security Situational Awareness.

This white paper describes the importance of geographic information system (GIS), as a scalable technology, and the role GIS plays in situational awareness.

Henry, D. (2012). Improving Preparedness Through Sharing Public Health and Homeland Security Information. National Governor's Association.

This vendor-authored white paper describes: the role of the governor's office in supporting information sharing, how states can build a "culture of preparedness," how fusion centers can support information exchange, and how cross-agency partnerships can bolster intelligence.

Jackson, B. (2006). Information Sharing and Emergency Responder Safety Management. The RAND Corporation.

In this slightly dated, yet useful testimony to the United States House of Representatives, the author shared findings from a study conducted on disaster responder information sharing needs. The four requirements he listed were: information about the hazard environment; information on the responder workforce; information on evolving safety issues; and information about safety equipment. Related recommendations are included.

Link, P., Brannman, P. S., Murphy, M., et al. (2013). Hospital Preparedness Program (HPP) Healthcare Preparedness Capability Review National Call: Capability 6: Information Sharing. U.S. Department of Health and Human Services, Office of the Assistant Secretary of Preparedness and Response.

This document contains notes from a national call conducted in August 2013 on Capability 6, Information Sharing. An overview of Capability 6 was provided to participants. National Healthcare Preparedness Program (NHPP) Awardees (Oklahoma, New Mexico, Kentucky, District of Columbia, Maryland, and Michigan) gave presentations on real world examples related to various information sharing experiences, which are also captured in this document.

* Lipsitch, M., Finelli, L., Heffernan, R., et al. (2011). Improving the Evidence Base for Decision Making During a Pandemic: The Example of 2009 Influenza H1N1. Biosecurity and Bioterrorism 9(2): 89-115.

The authors synthesize discussions held just after the 2009 H1N1 outbreak with a focus on surveillance needs specific to pandemic decision-making. They specific the necessary quantitative evidence and describe the sources of surveillance, interpretive tools, and other population-based data that can serve as the basis for such evidence.

Patel, D. and Olson, S. (2012). Information Sharing and Collaboration: Applications to Integrated Biosurveillance: Workshop Summary.

The goals of this workshop were: examine strengths and limitations of different models; identify best practices of information sharing; learn more about examples and lessons learn; explore various policy and performance measures; and share real-life scenarios that highlight the value of collaboration and information sharing. Chapter 2 includes examples shared by federal agencies and Chapter 3 highlights state experiences and tools.

RTI International. (2012). ONC State Health Policy Consortium Project: Health Information Exchange in Disaster Preparedness and Response.

The authors conducted a literature scan and conducted legal and technical workshops to determine the requirements necessary to enable interstate exchange of clinical data using Health Information Exchanges (HIE) following a disaster. The report suggests that the best way to ensure that health information can be easily accessed during a disaster is to ensure that this can happen every day and during more common emergencies and describes a multi-state existing system and policy and operational issues.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2015). Health Situational Awareness to Support Decision-Making.

The information on this webpage can help users understand the relationship between health situational awareness (HSA) and information sharing. Links to the five priorities of HSA and supportive actions that can be taken by federal agencies and their partners are provided.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2016). 2017-2022 Health Care Preparedness and Response Capabilities.

The guidance specific to these capabilities highlights what healthcare delivery system (e.g., hospitals, healthcare coalitions, and emergency medical services) have to do to effectively prepare for and respond to emergencies that impact the public's health. Objective 2 (Information Sharing) under Capability 2 (Health Care and Medical Response Coordination) includes three activities and related guidance: develop information sharing procedures; identify information access and data protection procedures; and utilize communications systems and platforms.

U.S. Department of Homeland Security. (2016). Critical Infrastructure Threat Information Sharing Framework: A Reference Guide for the Critical Infrastructure Community.

This reference describes the systems, access, and policies around sharing threat information between critical infrastructure and public safety. It also includes information on the various tools stakeholders can use to share different types of threat information.

U.S. Department of Homeland Security. (2017). DHS Common Operating Picture.

The core Department of Homeland Security situational awareness capability, the Common Operating Picture (COP) allows government and private sector stakeholders access to information that can help them make timely and informed decisions in times of crisis.

* U.S. Department of Justice. (2015). Joint Criminal and Epidemiological Investigations Handbook: 2015 Domestic Edition.

The authors highlight common concerns shared by law enforcement and public health: early identification of an outbreak, whether outbreak is naturally occurring or intentional, and protection of the public. The handbook highlights components of both fields and how they interact and complement each other; discusses investigational procedures and methodologies for a response to a biological threat; identifies challenges and solutions for improved information sharing (p. 55-60); and provides templates that can be replicated or customized.

U.S. Department of Justice's Global Justice Information Sharing Initiative. (2011). Health Security: Public Health and Medical Integration for Fusion Centers (An Appendix to the Baseline Capabilities for State and Major Urban Area Fusion Centers).

This guidance document encourages the integration of public health and medical providers into fusion center activity. Guidance is provided by fusion center capabilities and by management and administrative capabilities.

Information Sharing Systems

Centers for Disease Control and Prevention. (n.d.). CDC's Communication Resource Center. (Accessed 5/4/2017.)

This pamphlet describes the Centers for Disease Control and Prevention's Communications Resource Center (often referred to as JOIN). This site is password protected and offers state, local, and territorial partners online access to free, high quality, customizable tools and resources designed to support and enhance communication efforts.

Centers for Disease Control and Prevention. (n.d.). Epi-X. (Accessed 5/4/2017.)

Health professionals can use Epi-X to share preliminary health surveillance information rapidly and securely. Subscribers can also choose to be notified of breaking health news as events occur.

Centers for Disease Control and Prevention. (2017). Division of Health Informatics and Surveillance.

This website contains links to disease surveillance programs, information systems, and other related resources. Links to recent messages are included on this website as is a legend that explains types of messages disseminated by the system (alerts, advisories, updates, and general information).

Centers for Disease Control and Prevention. (2017). FluView.

The CDC FluView interactive report provides weekly influenza surveillance information in the United States. These applications were developed to enhance the weekly FluView report by better facilitating communication about influenza with the public health community, clinicians, scientists, and the general public. This series of dynamic visualizations allow any Internet user to access influenza information collected by CDC's monitoring systems.

Centers for Disease Control and Prevention. (2017). Health Alert Network.

The Centers for Disease Control and Prevention use this network to share cleared information about pressing public health incidents with public health professionals.

Centers for Disease Control and Prevention. (2017). National Electronic Disease Surveillance System (NEDSS) Base System (NBS).

This information system helps local, state, and territorial public health departments manage reportable disease data and send notifiable disease data to CDC. This tool can support the public health investigation workflow and can also process, analyze, and share disease-related health information. Reporting jurisdictions receive a compatible

information system they can use to transfer epidemiologic, laboratory, and clinical data securely and efficiently over the Internet.

Centers for Disease Control and Prevention. (2017). National Notifiable Diseases Surveillance System.

This system is used nationwide and allows public health agencies to share notifiable disease-related health information (and monitor, control, and prevent the occurrence and spread of state-reportable and nationally notifiable infectious and noninfectious diseases and conditions).

Centers for Disease Control and Prevention, National Syndromic Surveillance Program. (2017). BioSense Platform.

This platform allows health officials to quickly share and analyze syndromic data over time and across geographic boundaries. It features standardized tools and procedures that facilitate information collection, sharing, evaluation, and storage.

Defense Health Agency. (2013). Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE).

This fact sheet describes ESSENCE, a system that allows users to monitor certain worldwide Department of Defense outpatient healthcare data and provides alerts for unusual or rapid increases in the incidence of outbreaks and infectious diseases.

Office of the Director of National Intelligence. (n.d.). National Counterterrorism Center. (Accessed 5/4/2017).

The National Counterterrorism Center (NCTC) is staffed by personnel from multiple departments and agencies, including the U.S. Department of Health and Human Services. The Center produces items for the President's Daily Brief and the daily National Terrorism Bulletin, helps coordinate interagency collaboration, and disseminates a weekly update to senior policymakers regarding threats to the nation. NCTC also serves as the shared knowledge bank on known and suspected terrorists and international terror groups.

U.S. Department of Homeland Security. (2016). National Biosurveillance Integration Center.

This Center focuses on providing early warning and situational awareness of biological threats and works with federal, state, local, territorial, and tribal partners to analyze and share related information.

U.S. Department of Homeland Security. (2017). Homeland Security Information Network.

This network, referred to as "HSIN," allows federal, state, local, territorial, tribal, international, and public sector partners in emergency services, intelligence, law enforcement, and other fields to share Sensitive but Unclassified information through an invitational password-protected system.

University of North Carolina at Chapel Hill. (2017). North Carolina Disease Event Tracking and Epidemiological Collection Tool (NC-DETECT).

This statewide syndromic surveillance system allows authorized users to view data from emergency departments, the Carolinas Poison Center, and the Pre-Hospital Medical Information System. The web site includes links to data and reports and a frequently asked questions tab.

Lessons Learned

Bennett, K., Olsen, J., Harris, S., et al. (2013). The Perfect Storm of Information: Combining Traditional and Non-Traditional Data Sources for Public Health Situational Awareness During Hurricane Response. PLOS Currents Disasters. Dec 16. Edition 1.

The authors examined whether and how non-traditional data (e.g., tweets and media reports) filled a void in traditional data reporting during the response to Hurricane Isaac in 2012. They also studied the effect of non-traditional data on the timeliness for reporting identified Essential Elements of Information.

Bharosa, N., Lee, J., and Janssen, M. (2010). Challenges and Obstacles in Sharing and Coordinating Information during Multi-agency Disaster Response: Propositions from Field Exercises. Information Systems Frontiers. 12(1): 49-65.

This paper provides an overview of the relevant obstacles and challenges in regards to sharing and coordinating information by examining existing literature and then investigating a series of multi-agency disaster management exercises, using observations and a survey.

Booth, C. and Stewart, T. (2003). Communication in the Toronto Critical Care Community: Important Lessons Learned During SARS. Critical Care. 7(6): 405–406.

The authors describe information sharing during the critical care response to SARS. Some of the initiatives that helped the healthcare community exchange information include regular teleconference calls, web-based training and education, and the rapid coordination of research studies.

Brack, M. and Castillo, T. (2015). Data Sharing for Public Health: Key Lessons from Other Sectors.

The authors emphasize the cost of not sharing surveillance data, highlight data sharing processes from various perspectives, and share case studies based on interviews with subject experts. Though the document has a European focus it highlights key issues with both process and policy of information sharing between sectors.

Crowther, K. (2014). Understanding and Overcoming Information Sharing Failures. Journal of Homeland Security and Emergency Management. 11(1): 131-154.

The author reviewed the common information sharing failures that caused or exacerbated major catastrophes – the attack on Pearl Harbor, the 9/11 terrorist attacks, and Hurricane Katrina. His analysis revealed several categories of failure: partnering, communication, synthesis and decision-making, and awareness. Suggestions for future research and improvements are included.

* Goldacre, B., Harrison, S., Mahtani, K., and Heneghan, C. (2015). WHO Consultation on Data and Results Sharing During Public Health Emergencies. Background Briefing.

After the Ebola outbreak, the Center for Evidence-Based Medicine was asked to interview a variety of stakeholders to identify barriers and potential solutions specific to information and data sharing.

Greene, J. (2014). EMS and Information Sharing. Annals of Emergency Medicine 64(2): 15A-17A.

The author describes the challenges and related innovations in information sharing between emergency medical services professionals and the emergency medical care community. Though this emphasizes daily patient care it has direct applicability to the disaster setting and offers significant discussion of issues.

Harvard Humanitarian Initiative. (2011). Disaster Relief 2.0: The Future of Information Sharing in Humanitarian Emergencies.

This report highlights how social media was used by survivors of the 2010 earthquake that struck Haiti and how it was analyzed internationally to mobilize assistance and map damage. The authors note that “the international humanitarian system was not tooled to handle these two new information fire hoses” and discusses strategies for adapting to this type of information sharing to improve disaster response.

Howland, R., Li, W., Madsen, A., et al. (2015), Evaluating the Use of an Electronic Death Registration System for Mortality Surveillance During and After Hurricane Sandy: New York City, 2012. American Journal of Public Health 101(11): e55-e62.

The authors evaluated NYC's electronic death registration system for mortality surveillance during and after Hurricane Sandy, demonstrating how daily data systems can contribute significantly during disasters to impact assessment.

Institute of Medicine of the National Academies. (2014). Regional Disaster Response Coordination to Support Health Outcomes: Information Sharing and Incident Management— Workshop in Brief.

Workshop participants noted several essential elements of disaster information sharing: reliable systems that can be used by all involved during an incident; improved coordination between agencies and entities that would lead to better public messaging; the use of Scientific Response Units, which would provide an avenue for experts to contribute their knowledge to specific types of incidents; and identifying and using the right "amplifiers" for messages. Case studies from recent events are included.

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The authors synthesize discussions held just after the 2009 H1N1 outbreak with a focus on surveillance needs specific to pandemic decision-making. They discuss the necessary quantitative evidence and describe the sources of surveillance, interpretive tools, and other population-based data that can serve as the basis for such evidence.

Loschen, W., Holtry, R., Hazins, K., and Happel Lewis, S. (2013). Sharing Public Health Information with Non-Public Health Partners. Online Journal of Public Health Informatics. 5(1): e47.

The authors provide an overview of ESSENCE and describe how healthcare stakeholders from across the National Capital Region in Maryland, Virginia, and the District of Columbia worked together to develop it. This information sharing tool is currently used by public health and non-public health partners (e.g., emergency management, law enforcement, and other first responders).

Sane, J. and Edelstein, M. (2015). Overcoming Barriers to Data Sharing in Public Health: A Global Perspective.

The authors report findings from interviews with high-level decision-makers, field epidemiologists, academics and individuals responsible for disease surveillance at the national level, in both high income and low-middle income countries. Participants described how data sharing is part of their usual work; they also shared input on barriers to data sharing they have encountered or are aware of and how they overcame them (during routine surveillance and public health emergencies).

Shapiro, J., Genes, N., Kuperman, G., and Chason, K. (2010). Health Information Exchange, Biosurveillance Efforts, and Emergency Department Crowding During the Spring 2009 H1N1 Outbreak in New York City. (Abstract only.) Annals of Emergency Medicine 55(3): 274-276.

In this article, the authors examine how healthcare practitioners used health information exchange networks to share clinical data among otherwise unaffiliated providers across entire regions during the 2009 H1N1 outbreak.

Tsai, S., Hamby, T., Chu, A., et al. (2016). Development and Application of Syndromic Surveillance for Severe Weather Events Following Hurricane Sandy. (Abstract only.) Disaster Medicine and Public Health Preparedness. 10(3): 463-471

After Superstorm Sandy, the New Jersey Department of Health developed indicators to improve syndromic surveillance for extreme weather events in EpiCenter, an online system that allows users to collect and analyze real-time chief complaint emergency department data and classifies each visit by indicator or syndrome. This system was able to recognize indicators in carbon monoxide poisoning, methadone-related visits, and asthma. Recognizing sources of data and the indicators to be followed are important during planning and response.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2017). ASPR Electronic Medical Record (EMR) Data Share with FL Department of Health. (Contact fusion@hhs.gov for more information or to set up EMR data sharing capabilities.)

ASPR provided a de-identified data share of electronic medical record (EMR) data for patient encounters in the field to FL DOH. The data share process was piloted and tested successfully in 2014. Using the data share agreement in place, ASPR quickly re-tested the capability with FL DOH as Hurricane Matthew was approaching. When ASPR Disaster Medical Assistance Team (DMAT) teams were deployed to provide medical support at Holmes Regional Medical Center in Melbourne, FL, ASPR was able to provide an automated EMR data share (updated every 15 minutes) directly to FL DOH's surveillance system ESSENCE-FL. The ASPR DMAT mission was referenced in the "FL ESF8 Epi Surveillance Hurricane Matthew" report, as was an ASPR DMAT EMR patient

encounter data table. Additionally, FL shared their full Epi Surveillance report for Matthew with HHS ASPR.

* U.S. Department of Homeland Security. (n.d.). Draft Guidelines for Publishing and Sharing Information. (Accessed 3/30/2017.)

This report—while slightly dated—highlights Capstone 2014, an exercise conducted to develop, codify, and share a set of Essential Elements of Information (EEI; Table 1). Guidance for sharing information through various means (e.g., incident management information systems, geospatial tools) is also included.

Lessons Learned: Ebola

* Goldacre, B., Harrison, S., Mahtani, K., and Heneghan, C. (2015). WHO Consultation on Data and Results Sharing During Public Health Emergencies. Centre for Evidence-Based Medicine, Nuffield Department of Primary Care Health Sciences, University of Oxford.

The World Health Organization held a meeting to examine data sharing during the recent Ebola outbreak. Participants listed several challenges including: patient confidentiality, balancing rapid information sharing and accurate data, cultural and political issues, and reciprocity (nations concerned that the data they collect and share will be used to create expensive treatments and individuals concerned about sharing data without receiving credit). Participants also listed potential solutions to the challenges.

Region IV Public Health Training Center Network. (2015). The PHTC Network's Collective Role in Helping the Public Health Workforce Prepare for and Respond to Infectious Diseases: What We've Learned from Ebola.

This webinar is approximately 1.5 hours long and includes presentations on: the practice and roles of health departments in preventing and controlling infectious diseases; public health information sharing during a public health event; priority knowledge, skills, and abilities (KSAs) needed by the public health workforce to prepare for and respond to infectious diseases; and additional information from national partners.

Plans, Tools, and Templates

Association of State and Territorial Health Officials. (2013). Public Health and Information Sharing Toolkit: Legal Barriers Project.

This toolkit includes links to resources that focus public health agencies' authority to collect, use, and share information to prepare for and respond to a public health emergency. Resources include “executive overviews,” fact sheets, issue briefs, state analysis guides, and supplemental resources.

Centers for Disease Control and Prevention. (2016). PHIN Tools and Resources.

This site includes links to Public Health Information Network tools and resources; this information can help public health agencies to electronically exchange health data and information.

National Information Exchange Model. (n.d.). National Information Exchange Model (NIEM). (Accessed 5/4/2017.)

NIEM was developed by experts from a variety of fields, agencies, and organizations and serves as a common vocabulary that facilitates efficient information exchange. NIEM includes domains for Emergency Management, Justice, Military Operations, Surface Transportation, Biometrics, and Human Services. NIEM provides rules and methodologies around the use of the model as well as a standardized Information Exchange Development Lifecycle that can be reused by everyone. NIEM also includes governance, training, tools, technical assistance, and an engaged community that can provide user support.

* National Information Sharing Consortium. (2015). Essential Elements of Information Publication Guidance for Emergency Management Officials.

This guide, geared towards emergency management officials, highlights an agreed-upon definition of the information sharing components necessary for successful cross-jurisdictional information sharing. The three sections include an executive summary, a description of the Essential Elements of Information (EEI) design process, and Standard Operating Procedure Annex Templates that can be tailored as needed.

* U.S. Department of Health and Human Services. (2014). Appendix B: Essential Elements of Information. HHS Disaster Human Services Concept of Operations.

This appendix lists the essential elements of information related to a public health emergency or disaster response and the associated data source or agency.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2016). ASPR Fusion Tools.

This webpage contains links to the Fusion Analytics Dashboard, GeoHEALTH, and "Fusion Forums." These tools can help with decision making and tactical changes during a response, as they provide visibility on electronic medical record data and other factors. The page also includes a link to "Fusion Forums," where the public health emergency community discusses emerging technologies and trends in situational awareness and rapid decision support.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. (2016). ASPR Fusion Tools: Fusion Analytics.

Fusion Analytics was built using SAS Visual Analytics software to create secure, web-based analytic dashboards to allow users to view real-time information 24/7. The dashboards include a customizable interface displaying strategic information that aids decision-making during a response and are available to end-users via the internet at https://fusionanalytics.hhs.gov/. *(Note: while accounts for Fusion Analytics are limited to HHS employees, data from this tool can be used to share EMR data with states during an event. Any state interested in setting up an EMR data share should contact fusion@hhs.gov.)*

U.S. Department of Homeland Security. (n.d.). Resources for Emergency Medical Services and Fusion Center Collaboration. (Accessed 4/28/2017.)

This document includes agency summaries and contact information for various federal fusion centers and related organizations.

* U.S. Department of Justice. (2015). Joint Criminal and Epidemiological Investigations Handbook: 2015 Domestic Edition.

The authors highlight common concerns shared by law enforcement and public health: early identification of an outbreak, whether outbreak is naturally occurring or intentional, and protection of the public. The handbook highlights components of both fields and how they interact and complement each other; discusses investigational procedures and methodologies for a response to a biological threat; identifies challenges and solutions for improved information sharing (p. 55-60); and provides templates that can be replicated or customized.

U.S. Fire Administration. (2015). About the Emergency Management and Response — Information Sharing and Analysis Center.

This agency serves as an information sharing tool for critical infrastructure protection (CIP) and the emergency services sector (ESS). The agency publishes "The InfoGram" and CIP bulletins and provides technical assistance and consulting at no cost to ESS leaders.

Agencies and Organizations

Note: The agencies and organizations listed in this section have a page, program, or specific research dedicated to this topic area.

Centers for Disease Control and Prevention. Health Alert Network.

Centers for Disease Control and Prevention. National Electronic Disease Surveillance System (NEDSS) Base System (NBS).

Federal Bureau of Investigation. Infraguard.

National Health Information Sharing and Analysis Center.

Office of the Director of National Intelligence. National Counterterrorism Center.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response. ASPR Fusion.

U.S. Department of Homeland Security. Information Sharing.

U.S. Department of Homeland Security. State and Major Urban Area Fusion Centers.

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