Topic Collection: Electronic Health Records

Patient data is as voluminous as it is vital. Recent disasters have highlighted the need for patient data to be accessible by emergency medical providers. Many healthcare facilities have switched to using electronic health records (EHR) to store patient health history and other data, but many still use paper tracking systems. There are several Health Information Technology/EHR programs available, making interoperability a challenge. Lessons learned from recent disasters highlight both the utility of these programs and the challenges associated with data collection, access, quality, and transfer capabilities. The resources in this Topic Collection include guidance and lessons learned specific to EHR.

Access the following ASPR TRACIE Topic Collections for additional, related information: Communication System; Cybersecurity; Information Sharing; and Virtual Medical Care.

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
Guidance
Lessons Learned: Earthquakes
Lessons Learned: General
Lessons Learned: Hurricanes
Lessons Learned: Infectious Disease
Lessons Learned: Information Technology Failure/Cyberattack
Lessons Learned: Tornadoes
Plans, Tools, and Templates
Agencies and Organizations

Must Reads


The authors discuss how electronic health records were used after Hurricane Katrina, in Haiti after the 2010 earthquake, and in Joplin MO, post-tornado.

In addition to emphasizing the importance of having a plan, the author shares tips for managing an outage under several categories: communication, patient intake and scheduling, and clinical documentation.


This white paper provides an overview of the digitalization of healthcare information. Understanding data backups and recovery times to safeguard electronic health records for facility health information systems will support planning and best practices to maintain continuity of patient care during a disaster disruption.


This article includes a list of considerations that planners can use as guidance when developing or improving information technology and electronic health records systems.


The authors describe the disruption of the computer systems at Mount Sinai Medical Center in New York City on a single day, the hospital's response to the event, and subsequent modifications to emergency plans incorporating lessons learned. They found that departments that utilized a combination of electronic and paper systems were impacted less than the Emergency Department, which was completely reliant on electronic medical records.


The author summarizes recent history of the role of paper and electronic health records (EHR) and disaster, emphasizes the need for facilities to modernize record keeping (while addressing privacy concerns), and lists the benefits of EHR.


This article summarizes and provides links to resources related to the role played by electronic health records before, during, and after Hurricane Sandy. These resources are primarily articles authored by or interviews conducted with healthcare providers who shared their experiences.

While the Long Beach Medical Center (New York) was rendered inoperable after Hurricane Sandy, their electronic health records (EHR) system remained functional. The authors share how the hospital’s EHR system helped with continuity and record recovery.


This report describes how KatrinaHealth, an online service developed to help Hurricane Katrina survivors, worked with healthcare providers to grant them access to evacuees’ records of medications (including dosages). The authors also share successes and challenges of the program and recommendations for the future.


The author shares her experience losing access to her facility's electronic health record system for ten days following a power outage.


When electronic health records (EHR) are unavailable, this can have a negative effect on patient care and can lead to medication errors, images being unavailable, and the need to cancel procedures. The guidance in this document can help healthcare facilities establish contingency planning for planned or unplanned EHR outages.


The Primary Care Information Project (PCIP) at the New York City Department of Health and Mental Hygiene worked with local clinicians to establish an electronic data system, and the authors reviewed PCIP-generated data sets to assess the impact of Hurricane Sandy. The authors discuss findings, including the strengths and challenges associated with using electronic health records in post-disaster settings.


The authors explain how the use of electronic medical records (EMR) helped the healthcare community maintain operations after the Joplin tornado and emphasize the importance of incorporating EHR and information technology into emergency operations plans.

The authors share their hypothesis regarding the treating physician’s notes from the primary encounter with the first-ever travel-associate case of Ebola in U.S. history and highlight how language and symptom description were likely chosen from pre-scripted options in the electronic health record (EHR) system, contributing to a missed diagnosis. They explain the ripple effects of diagnostic errors made in EHRs and suggest related reforms in policy and practice.


This report details findings from a questionnaire sent to 400 hospitals that are reimbursed for using a certified electronic health records (EHR) system. Nearly all respondents reported having contingency plans for their EHR systems, but the authors emphasize the need for the Office of Civil Rights to implement a related, consistent audit program.

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 Florida Department of Health (FL DOH) from Disaster Medical Assistance Team (DMAT) teams deployed after Hurricane Matthew 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 resulting in robust state/federal data sharing.

Guidance


After a mass casualty incident (MCI), a task force was formed to review delays in radiology orders. They created a “browse page” that listed every type of x-ray and CT scan that might be needed in a similar event (and all required information was to "Disaster"). Tools like this can save time and hasten patient care in MCI and surge scenarios.

This article describes personal health records (PHRs) and their utility in disaster situations. It contrasts the instant availability of PHRs against the electronic medical record/health records that require 3rd party (provider) routing.


In addition to emphasizing the importance of having a plan, the author shares tips for managing an outage under several categories: communication, patient intake and scheduling, and clinical documentation.


This white paper provides an overview of the digitalization of healthcare information. Understanding data backups and recovery times to safeguard electronic health records for facility health information systems will support planning and best practices to maintain continuity of patient care during a disaster disruption.


This article highlights the benefits of using an electronic medical record system to help manage mass casualty incidents.


This webpage provides information and resources on emergency medical services (EMS) and emergency preparedness as it relates to health information technology.


The authors discuss the challenges associated with electronic health records (e.g., data entry error, interoperability and processing issues) and present suggestions for addressing these challenges.


The integration of Picture Archiving and Communication System (PACS) has improved access to patient image retrieval and storage. The authors emphasize the importance of having a robust disaster recovery plan in place to minimize PACS disruption; they list six primary issues for planners to consider integrating in their recovery designs.
This report discusses health information exchange, state-specific legal barriers, and the benefits of using electronic health records and other data sources before a disaster strikes to promote more efficient response and recovery phases.


With cloud computing being used to help store and handle large amounts of data, it is important to be aware of threats to security and privacy preservation. The authors review studies and propose and discuss two approaches to healthcare cloud data management: the Security-Preserving approach and the Privacy-Preserving approach.


While not disaster- or emergency-specific, this guide can help healthcare coalitions and healthcare providers and facilities learn more about the role of electronic health records systems in local health information exchanges.

The Office of the National Coordinator for Health Information Technology. (2017). Section 4: Opioid Epidemic & Health IT. Health IT Playbook.

This section of the playbook explains how healthcare providers can use health information technology solutions (including electronic health records) to address the opioid epidemic. Links to other helpful tools and resources are also provided.

Lessons Learned: Earthquakes


After the 2010 Haiti earthquake, the U.S. Department of Health and Human Services used an Electronic Medical Record (EMR) system to support healthcare decision-making and report patient encounters. The authors share lessons learned, including the need to improve the EMR diagnosis categorization process since close to half of the records were missing medical data.

This article explains how the Israel Defense Force Medical Corps set up a field hospital after the 2010 Haiti earthquake, complete with information technology that included electronic medical records (EMR). The authors share their positive experiences with the EMR and encourage the incorporation of similar systems in disaster response plans.

Lessons Learned: General


The authors discuss how electronic health records were used after Hurricane Katrina, in Haiti after the 2010 earthquake, and in Joplin MO, post-tornado.


These success stories—which not disaster-related—highlight the benefits of interoperability (which could bolster disaster response), such as improved care coordination, accelerated emergency discharges, more accurate documentation, and reduction in duplication.


The author cites recent incidents (the shooting in Las Vegas, the fires in Northern California, and the hurricanes in Houston, Puerto Rico, and throughout the Southeast) and the critical role played by electronic health records in patient tracking, determining medical and medication history, patient identification and reunification.


The author summarizes recent history of the role of paper and electronic health records (EHR) and disaster, emphasizes the need for facilities to modernize record keeping (while addressing privacy concerns), and lists the benefits of EHR.


The project team analyzed qualitative data from focus groups and interviews conducted with physician leaders from seven hospitals who handled patients injured during the Boston Marathon bombings. Challenges with technology were discussed (along with other issues) as were plans for incorporating lessons learned.

The authors share how hospitals reported data (immunizations, emergency department visits, and infectious disease laboratory results) as it related to the Centers for Medicare and Medicaid Services' Electronic Health Record (EHR) Incentive Program. While not disaster-specific, the findings can be used to determine readiness and integration, and identify gaps in EHR planning.


The authors share findings from post-incident briefing that included challenges with “unidentified patient naming convention, real-time situational awareness of patient location, and documentation of assessments, orders, and procedures.” To address these lessons learned, they updated select systems and clarified roles and responsibilities for maintaining electronic systems.


The authors discuss how linking electronic health record data could have helped healthcare providers identify at-risk patients after the Middle Tennessee Flood of 2010. They emphasize that geocoding patient addresses can be combined with other data to help produce “actionable alerts, reminders and other events for clinical decision support, care coordination and outreach.”


The authors provide an overview on three threats (bioterrorism, mass-casualty events, and the delivery of optimal health care to remote military field sites), and the associated demand for collection, analysis, coordination, and dissemination of health data.


This report details findings from a questionnaire sent to 400 hospitals that are reimbursed for using a certified electronic health records (EHR) system. Nearly all respondents reported having contingency plans for their EHR systems, but the authors emphasize the need for the Office of Civil Rights to implement a related, consistent audit program.
Lessons Learned: Hurricanes


In this study, the authors explain how electronic health records helped the Department of Veterans Affairs maintain continuity of care for evacuated veterans after Hurricane Katrina.


Healthcare planners can learn more about how incorporating electronic health records (EHR) and other lessons learned from recent disasters bolstered the medical responses to Hurricane Harvey and the California wildfires. The authors share lessons learned from Hurricane Katrina (particularly from the Veteran’s Administration, which used EHR at the time); describe the role of the Health Information Technology for Economic and Clinical Health Act; and share how tools such as EmPOWER serve vulnerable populations before, during, and after disasters.


This article summarizes and provides links to resources related to the role played by electronic health records before, during, and after Hurricane Sandy. These resources are primarily articles authored by or interviews conducted with healthcare providers who shared their experiences. (Note: link to audio is broken.)


While the Long Beach Medical Center (New York) was rendered inoperable after Hurricane Sandy, their electronic health records (EHR) system remained functional. The authors share how the hospital’s EHR system helped with continuity and record recovery.


This report describes how KatrinaHealth, an online service developed to help Hurricane Katrina survivors, worked with healthcare providers to grant them access to evacuees’ records of medications (including dosages). The authors also share successes and challenges of the program and recommendations for the future.

Lessons learned from Hurricanes Katrina and Sandy helped healthcare develop and implement electronic health records (EHR) systems, but because of several challenges, many patients find their records difficult to access after a disaster. The author explains these challenges and shares how the federal government’s “Patient Unified Lookup System for Emergencies,” or “PULSE” program is being pilot tested to help healthcare providers address these challenges.


The Primary Care Information Project (PCIP) at the New York City Department of Health and Mental Hygiene worked with local clinicians to establish an electronic data system, and the authors reviewed PCIP-generated data sets to assess the impact of Hurricane Sandy. The authors discuss findings, including the strengths and challenges associated with using electronic health records in post-disaster settings.


Because the majority of healthcare providers in the Houston area use electronic health records, patient evacuation and tracking and general health data management post-Hurricane Harvey continued relatively smoothly. The author shares how lessons learned from past incidents were incorporated into existing plans and programs.


Several hospitals contacted by the author reported that their electronic health records (EHR) systems remained connected throughout and after the storm. The author also discusses the past and future of EHR and the use of emPOWER to identify and communicate with patients who rely on electricity-dependent medical and assistive equipment.

* 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.)

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Lessons Learned: Infectious Disease

Kurtzman, L. (2017). *UCSF Innovators Use EHRs to Track Hospital-Acquired Infection*. This article summarizes a study that used electronic health records (EHR) to track patient movement and the odds of C. diff infection resulting from exposure. EHR allowed the researchers to note patient locations outside of their hospital rooms (e.g., CT scanners in the emergency department) which contributed to the study’s robust methodology and results.


The authors share their experiences and lessons learned from developing “OpenMRS-Ebola,” an EHR system for the Kerry Town (Sierre Leone) Ebola Treatment Center.


The authors share their hypothesis regarding the treating physician’s notes from the primary encounter with the first-ever travel-associate case of Ebola in U.S. history and highlight how language and symptom description were likely chosen from pre-scripted options in the electronic health record (HER) system, contributing to a missed diagnosis. They explain the ripple effects of diagnostic errors made in EHRs and suggest related reforms in policy and practice.

Lessons Learned: Information Technology Failure/Cyberattack

Genes, N., Chary, M., and Chason, K. (2013). *An Academic Medical Center's Response to Widespread Computer Failure*. The authors describe the disruption of the computer systems at Mount Sinai Medical Center in New York City on a single day, the hospital's response to the event, and subsequent modifications to emergency plans incorporating lessons learned. They found that departments that utilized a combination of electronic and paper systems were impacted less than the Emergency Department, which was completely reliant on electronic medical records.

Minghella, L. (2013). *Be Prepared: Lessons from an Extended Outage of a Hospital's EHR System*. The author shares her experience losing access to her facility's electronic health record system for ten days following a power outage.
Lessons Learned: Tornadoes


The author explains how the Moore Medical Center (which was destroyed by the May 20 tornado) treated, transferred, and tracked incoming and existing patients using electronic medical records.


The authors explain how the use of electronic medical records (EMR) helped the healthcare community maintain operations after the Joplin tornado and emphasize the importance of incorporating EHR and information technology into emergency operations plans.

Thew, J. (2012). When Disaster Strikes: EHRs Key in Managing Medical Emergencies.

Having an electronic health records (EHR) system in place allowed the St. John’s Medical Center (Joplin, MO) to continue providing care even after the tornado devastated the facility and surrounding areas. The author shares lessons learned and her thoughts on the need for a nationally integrated EHR system.

Plans, Tools, and Templates


The purpose of this toolkit is to help professionals working in local, state, and territorial health departments have better access to the electronic health record systems in healthcare facilities (e.g., hospitals, outpatient clinics, surgical centers) during outbreaks, including outbreaks of healthcare-associated infections.

California Association of Health Information Exchanges. (2017). PULSE.

This tool allows select healthcare professionals involved in an active disaster response to access to a patient’s health information during time of a large-scale emergency or disaster. Links to registration and other helpful resources are included on this webpage. (Access Cothren 2017 for related PowerPoint presentation.)

This article includes a list of considerations that planners can use as guidance when developing or improving information technology and electronic health records systems.


In this PowerPoint presentation, the author provides an overview of the tool, how it is designed, and how data flows through the system.


When electronic health records (EHR) are unavailable, this can have a negative effect on patient care and can lead to medication errors, images being unavailable, and the need to cancel procedures. The guidance in this document can help healthcare facilities establish contingency planning for planned or unplanned EHR outages.


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.

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Agencies and Organizations

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

Electronic Health Record Association.


Office of the National Coordinator for Health Information Technology. HealthIT.gov.

This ASPR TRACIE Topic Collection was comprehensively reviewed in December 2017 by the following subject matter experts (listed in alphabetical order):

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