Robust communication systems can allow first responders and medical professionals to maintain communication after a disaster. Back-up systems should be established based on best practices and tested regularly. The resources in this Topic Collection include promising practices, reports, evaluations, and overviews of programs focused on creating and maintain resilient emergency communication systems.

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**
- Amateur/Ham Radio Resources
- Applications and Technology
- Education and Training
- General Information
- Guidance/Guidelines
- Lessons Learned
- Operational Policies/Procedures
- Plans, Tools, and Templates
- Agencies and Organizations

**Must Reads**


The authors discuss communicating among medical personnel during disasters and highlight findings from the use of a mobile emergency application (which is not available anymore) and server device to cope with emergencies and facilitate all the related activities and communications (e.g., tracking patients, contacting others, and guiding medical personnel with help from the command center). The research was conducted in Italy, but may be useful to healthcare practitioners and planners in other countries to suggest system features or development ideas.


This European Union-based research report discusses the needs and methods for communicating to health professionals in epidemic situations, based on challenges in reaching all of these professionals during the 2009 H1N1 outbreak.
The resources on this page provide an overview of the program, history of the program, standard operating procedures for hospital disaster teams, and two training resources (one for hospital staff and another on message handling).


This guidance document lays out governance challenges, best practices, and recommendations for emergency managers at all levels to use in assessing, establishing, and maintaining communications governance. The document includes on the government landscape; charters, bylaws, and memorandum of agreement; the key elements of a governance body; and components of inter and intrastate local governance bodies.


These guidelines from the U.S. Federal Communications Commission (FCC) cover communication items to address in hospital disaster planning. They include: preparedness steps (e.g., developing a communications response team and employee contact lists); steps for assessing communications systems to determine where redundancy is required; setting up policies and protocols for emergency notifications; and planning for power disruptions. Response considerations are also included (e.g., determining mission critical, important, and minor capabilities, and assessing the system after the incident).

**Amateur/Ham Radio Resources**


This list of frequently asked questions can help hospital staff understand the use of ham radios as an alternative when traditional communication tools fail (e.g., during a disaster). While the information is specific to operators in Orange County, California, it can be applied by others across the country.

Hospital Disaster Support Communications System. (2016). *Hospital Disaster Support Communications System.*

The Hospital Disaster Support Communications System (HDSCS) is a group of volunteer Amateur Radio ("ham") operators who are available to provide backup internal and external communications for critical medical facilities in Orange County, California.
when necessary. HDSCS has been operational for more than 35 years; their website includes links to relevant resources.


This page is home to the Kent County HosCom, the amateur radio link between emergency services in Kent County, Michigan. It is a free service that, when enacted, supports federal, state, and local agencies (including healthcare facilities) with backup communication tools.

Moell, J. (2015). When the Shaking Starts, It's Too Late to Plan.

The author emphasizes the importance of emergency preparedness for amateur radio operators who support medical facilities.


The resources on this page provide an overview of the program, history of the program, standard operating procedures for hospital disaster teams, and two training resources (one for hospital staff and another on message handling).

Applications and Technology


The authors discuss communicating among medical personnel during disasters and highlight findings from the use of a mobile emergency application (which is not available anymore) and server device to cope with emergencies and facilitate all the related activities and communications (e.g., tracking patients, contacting others, and guiding medical personnel with help from the command center). The research was conducted in Italy, but may be useful to healthcare practitioners and planners in other countries to suggest system features or development ideas.


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.

This position paper, which is based on a review of the literature and a field case study, discusses the strategic value of integrating RFID into e-government development and government's comprehensive natural disaster management policy for improved preparedness, response, recovery, and mitigation.


This presentation demonstrates the feasibility of using cost-effective, flexible, and scalable sensor networks to address critical bottlenecks of the emergency response process in lieu of manual vital measurements, paper documentation, and radio communication.


The authors studied the feasibility of using mobile phones and short message service (SMS) texts to collect situational awareness data through surveys during simulated public health critical events during a university-based pilot study.


The authors discuss the wireless transmission of vital health data in disaster situations and a fair way to prioritize patient data categorization and transmission when there is bandwidth congestion or connectivity issues.


This article discusses the benefits of an interdepartmental mission control system that can help healthcare providers visualize throughput, flow, and real-time bed capacity in a hospital or hospital system.

This article is a review of electronic victim tracking systems for mass casualty incidents, and their ability to mitigate problems such as those experienced with tracking victims of Hurricane Katrina.


This resource discusses multihop ad hoc network paradigms to address lack of telecommunications in disaster scenarios, highlighting their applicability to important tasks in disaster relief operations. The authors review the main work found in the literature, and outline the open challenges and future research directions for the use of ad hoc networks in disaster scenarios.

**Education and Training**

*Interoperable Communications Technical Assistance Program. (n.d.). Public Safety Tools.*  
(Accessed 3/29/2016.)

This website includes links to a variety of tools, resources, and courses geared towards first responder communications.

**General Information**

Centers for Disease Control and Prevention, National Center for Environmental Health, Division of Environmental Hazards and Health Effects, Radiation Studies Branch. (2003). *Roundtable on Hospital Communications in a Mass Casualty Radiological Event*.

This expert roundtable summary includes recommendations for communications policies, protocols, and capabilities during a large-scale radiological event. Overall, participants recommended that hazard-specific communications plans be integrated into a hospital's all-hazards communications plan.


The author provides an overview of traditional communications tools and related failure modes, followed by an overview of alternative strategies (e.g., infrared, microwave, and satellite).

The authors compare the capabilities of two popular systems used to collect and map open source disaster information: Project Epic’s Tweak the Tweet (TtT) and Ushahidi. The research compares and contrasts the frequency, content, and location components of information in both systems. Based on the results, the authors identify considerations for future social media mapping tools to support crisis management.


The author emphasizes the need to consider multiple factors when considering eliminating pagers for cellular devices.


This article describes study results outlining technological and communication issues between Emergency Medical Services (EMS) and Emergency Department (ED) teams. The authors note that the coordination of awareness, context, and workflow are key for next generation communication tools.


This article discusses the use of decision support systems for improving instant communication regarding command and control, and resource allocation during disasters.

Guidance/Guidelines


This PowerPoint presentation is a summary of the Partnership for Effective Emergency Response (PEER) project, which enhances communication to health agencies in the greater Boston area during emergencies and disasters.

This guidance document lays out governance challenges, best practices, and recommendations for emergency managers at all levels to use in assessing, establishing, and maintaining communications governance. The document includes on the government landscape; charters, bylaws, and memorandum of agreement; the key elements of a governance body; and components of inter and intrastate local governance bodies.


This call summary describes the National Hospital Preparedness Program Information Sharing Capability. It provides guidance to hospitals regarding patient tracking systems and interoperability of communications equipment, as well as examples of information sharing implementation.


This article discusses redundant lower-tech methods for communicating to ensure staff are able to stay in touch in case of a loss of technological capability.


This webpage includes answers to frequently asked questions about the Government Emergency Telecommunications Service.


This webpage includes answers to frequently asked questions about the Telecommunications Service Priority program.


These guidelines from the U.S. Federal Communications Commission (FCC) cover communication items to address in hospital disaster planning. They include: preparedness steps (e.g., developing a communications response team and employee contact lists); steps for assessing communications systems to determine where redundancy is required; setting up policies and protocols for emergency notifications; and planning for power disruptions. Response considerations are also included (e.g., determining mission critical, important, and minor capabilities, and assessing the system after the incident).
Lessons Learned


The authors highlight communications challenges associated with recent incidents involving violent acts committed against hospital staff; brief suggestions for overcoming these challenges are also listed.


Radio devices typically cannot communicate with each other unless they operate on the same frequency and use the same mode without a dispatcher. This vendor-produced case study described the use of a Land Mobile Radio-over-IP option to address this challenge and found it increased communications, reduced costs, and was a flexible and resilient tool.


This vendor-produced case study details how two companies designed the "Rapid Emergency Satellite Communications" system for Rhode Island Hospital (who in turn shared the system throughout the state).


The authors conducted a qualitative study and share anecdotal evidence suggesting communication mistakes (e.g., interoperability, infrastructure issues) are still being repeated, incident after incident. Suggestions for improvement on a variety of disaster-related topics are included.


This EU based research report discusses the needs and methods for communicating to health professionals in epidemic situations, based on challenges in reaching all of these professionals during the 2009 H1N1 outbreak.


This article discusses the utility of phone tree protocols for mobilization of ED staff in a New York City Hospital, and the importance of testing them in advance of an emergency.

This article describes research showing preparedness gaps in Pennsylvania Hospitals and the importance of emergency communications equipment for increasing worker safety in relation to violent patients and visitors.


This article describes a World Health Organization Quality Improvement Study for disaster communications. Findings include the need for employee listservs, international media contacts, pre-written public service announcements in multiple languages on questions that frequently arise during disasters, and a central database to house this information.


Pages 21-23 of this document focus on communications lessons learned by staff from Mercy Hospital in Joplin and how they can be incorporated into healthcare facility emergency plans.

**Operational Policies/Procedures**


MNTrac (Minnesota system for Tracking Resources, Alerts and Communication) is a database-driven, password-protected web application designed to track bed capacity, but it also supports emergency incident planning, emergency communication, and emergency alert notifications in real time. It serves a variety of healthcare agencies, including hospitals, emergency medical services, public health, poison control, the state department of health, and skilled nursing facilities.


This webpage highlights the role of this federal division (to establish, maintain, and coordinate emergency communications services and information systems critical the coordination of the federal government’s response before, during, and after an incident or planned event). Information on the six Mobile Emergency Response Support detachments and numerous Mobile Communications Office Vehicles is also included.
Plans, Tools, and Templates


Emergency planners can use the information contained in this guide to develop materials based on commonly-used abbreviations, acronyms, and terms.

*Interoperable Communications Technical Assistance Program. (n.d.). Public Safety Tools.*
(Accessed 3/29/2016.)

This website includes links to a variety of tools, resources, and courses geared towards first responder communications.


This state plan is in a standard template form that illustrates how most states organize themselves for communications across different levels of government, vocational fields, and into non-governmental organizations such as hospitals.

(Accessed 3/7/2016.) Central Coast Children’s Foundation, Inc.

This resource list contains links to tools and apps for disaster communication with an emphasis on resources for those with communication difficulties.


This template--geared towards a local, regional level--can help planners create a charter for an interoperability committee or governance group. It is laid out as a sample charter and includes suggested headings for each section as well as potential issues/questions that should be addressed when developing a committee.


This 5-year strategy document outlines the federal direction for getting the latest interoperable communication technology to all disaster response entities across the nation.

The Government Emergency Telecommunications Service is a federal communications system meant to be used in an emergency or crisis situation when the landline network is congested and the likelihood of completing a call using traditional methods is reduced.


This federal program authorizes national security and emergency preparedness organizations to receive priority treatment for telecommunications services.


This catalog lists federally-funded Office of Emergency Communications/ Interoperable Communications Technical Assistance Program programs under several categories (e.g., statewide communications interoperability planning, exercise and operational support, and communication assets survey and mapping).

 Agencies and Organizations

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


Hospital Disaster Support Communications System.

Interoperable Communications Technical Assistance Program.

Radio Amateur Civil Emergency Service. RACES Resource Library.

This ASPR TRACIE Topic Collection was comprehensively reviewed in March 2016 by the following subject matter experts (listed in alphabetical order): Julie Bulson, MPA, BSN, RN, Director, Emergency Preparedness, Spectrum Health; John Hick, MD, HHS ASPR and Hennepin County Medical Center; and Christopher Riccardi, CHSP, CHEP, Emergency Management Officer, Disaster Preparedness and Project Coordinator, Providence Little Company of Mary Medical Center Torrance.