



TRACIE

HEALTHCARE EMERGENCY PREPAREDNESS
INFORMATION GATEWAY

Communication Systems
Topic Collection
4/11/2016

Topic Collection: Communication Systems

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

Bellini, P., Boncinelli, S., Grossi, F. et al. (2013). [Mobile Emergency, an Emergency Support System for Hospitals in Mobile Devices: Pilot Study](#). JMIR Research Protocols. 2(1): e19.

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.

European Union of General Practitioners. (2013). [Report on Health Care Professional Communication Requirements](#).

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.

Radio Amateur Civil Emergency Service. (2006). [RACES Library: Amateur Radio Emergency Network for Hospitals](#).

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).

SAFECOM and the National Council of Statewide Interoperability Coordinators. (2015). [Emergency Communications Governance Guide for State, Local, Tribal, and Territorial Officials](#).

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.

U.S. Federal Communications Commission. (n.d.) [Emergency Planning: Health Care Sector](#). (Accessed 4/11/2016.)

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

Hospital Disaster Support Communications System. (2015). [Frequently Asked Questions About HDSCS From Administrators and Emergency Planners in Hospitals](#).

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.

Kent County Radio Amateur Civil Emergency Service. (2016). [Hospital Communications](#).

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.

Radio Amateur Civil Emergency Service. (2006). [RACES Library: Amateur Radio Emergency Network for Hospitals](#).

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Applications and Technology

Bellini, P., Boncinelli, S., Grossi, F. et al. (2013). [Mobile Emergency, an Emergency Support System for Hospitals in Mobile Devices: Pilot Study](#). JMIR Research Protocols. 2(1): e19.

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.

Bouri, N. and Ravi, S. (2014). [Going Mobile: How Mobile Personal Health Records Can Improve Health Care During Emergencies](#). Journal of Medical Internet Research-mHealth. 2(1):e8.

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.

Chatfield, A., Wamba, S.F. and Hirokazu, T. (2010). [E-Government Challenge in Disaster Evacuation Response: The Role of RFID Technology in Building Safe and Secure Local Communities](#). 43rd Hawaii International Conferences on System Sciences (HICSS), Electronic Government, Emerging Topics.

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.

Gao, T., Pesto, C., Selavo, L., et al. (2008). [Wireless Medical Sensor Networks in Emergency Response: Implementation and Pilot Results](#). Technologies for Homeland Security IEEE Conference.

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.

Magee, M., Isakov, A., Paradise, H. and Sullivan, P. (2011). [Mobile Phones and Short Message Service Texts to Collect Situational Awareness Data During Simulated Public Health Critical Events](#). (Abstract only.) American Journal of Disaster Medicine. 6(6):379-85.

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.

Misra, S. and Chatterjee, S. (2014). [Social Choice Considerations in Cloud-Assisted WBAN Architecture for Post-Disaster Healthcare: Data Aggregation and Channelization](#). (Abstract only.) Information Sciences. 284:95-117.

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.

Morris, M. and Carter, K. (2015). [A Blended Transfer and Communications Center- Designing a State-of-the-Art Mission Control](#). (First page only.) Nursing Administration Quarterly. 39(4):357-361.

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.

Pate, B. (2008). [Identifying and Tracking Disaster Victims: State-of-the-Art Technology Review](#). (Abstract only.) Family and Community Health. 31(1):23-34.

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.

Reina, D., Askalani, M., Toral, S., et al. (2015). [A Survey on Multihop Ad Hoc Networks for Disaster Response Scenarios](#). International Journal of Distributed Sensor Networks. 2015: Article ID 647037. doi:10.1155/2015/647037

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.

Kennedy, J. (2006). [Alternate Communications During Times of Disaster](#).

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).

McClendon, S. and Robinson, A. (2013). [Leveraging Geospatially-Oriented Social Media Communications in Disaster Response](#). International Journal of Information Systems for Crisis Response and Management. 5(1).

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.

McNaught, T. (2012). [Reliable Communication in a Disaster](#).

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

Reddy, M., Paul, S., Abraham, J. et al. (2009). [Challenges to Effective Crisis Management: Using Information and Communication Technologies to Coordinate Emergency Medical Services and Emergency Department Teams](#). (Abstract only.) International Journal of Medical Informatics. 78(4):259-269.

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.

Thompson, S., Altay, N., Green, W. and Lapetina, J. (2006). [Improving Disaster Response Efforts with Decision Support Systems](#). (Abstract only.) International Journal of Emergency Management. 3(4):250.

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

Guidance/Guidelines

Hyde, J., Tsoi, J., Worden Kenefick, H., and Cox, H. (n.d.). [Use of a Theoretical Framework for Coalition Building and Evaluation Among Five Healthcare Disciplines in Massachusetts](#). (Accessed 3/8/2016.) U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Health.

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.

SAFECOM and the National Council of Statewide Interoperability Coordinators. (2015). [Emergency Communications Governance Guide for State, Local, Tribal, and Territorial Officials](#).

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.

U.S. Department of Health and Human Services. (2013). [Hospital Preparedness Program \(HPP\) Healthcare Preparedness Capability Review National Call-Capability 6: Information Sharing.](#)

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.

U.S. Department of Health and Human Services, Healthcare and Public Health Sector Coordinating Councils. (n.d.) [Working Without Technology: How Hospitals and Healthcare Organizations Can Manage Communication Failure.](#) (Accessed February 2, 2016.)

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.

U.S. Department of Homeland Security. (2015). [GETS FAQ.](#)

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

U.S. Department of Homeland Security. (2015). [TSP FAQ.](#)

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

U.S. Federal Communications Commission. (n.d.) [Emergency Planning: Health Care Sector.](#) (Accessed 4/11/2016.)

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

AtHoc. (n.d.). [Protecting Healthcare Personnel Through Emergency Communications](#). (Accessed 4/6/2016.)

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.

Cisco. (n.d.) [Mobility Case Study: How Wireless IP Communications Supports Fast Emergency Response](#). (Accessed 3/9/2016.)

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.

Cisco. (2010). [Hospital System Improves Emergency Response](#).

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).

Donahue, A. and Tuohy, R. (2006). [Lessons We Don't Learn: A Study of the Lessons of Disasters, Why We Repeat Them, and How We Can Learn From Them](#). Homeland Security Affairs. 2(4).

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.

European Union of General Practitioners. (2013). [Report on Health Care Professional Communication Requirements](#).

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.

Goldman, M., Anderson, T., Zehtabchi, S., and Arquilla, B. (2007). [Testing Hospital Disaster Communication Plan has Immense Value](#). Disaster Management and Response. 5(2):27.

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.

Martindell, D. (2011). [Survey of Emergency Department Practices in Pennsylvania Hospitals to Protect Patients and Staff](#). Pennsylvania Patient Safety Advisory. 8(4):126-130.

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.

Medford-Davis, L. and Kapur, B. (2014). [Preparing for Effective Communications During Disasters: Lessons From a World Health Organization Quality Improvement Project](#). International Journal of Emergency Medicine. 7:15.

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.

Missouri Hospital Association. (2012). [Preparedness and Partnerships: Lessons Learned From the Missouri Disasters of 2011](#).

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

Minnesota Department of Health. (2016). [MNTrac Overview](#).

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.

U.S. Federal Emergency Management Agency. (2016). [Disaster Emergency Communications Division](#).

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

Federal Emergency Management Agency. (2009). [Acronyms, Abbreviations, and Terms: A Capability Assurance Job Aid.](#)

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.

Massachusetts Executive Office of Public Safety and Security. (2007). [Statewide Communications Interoperability Plan.](#)

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.

Pressman, H. (n.d.) [Free Tools for Communicating During Disasters and Emergencies.](#) (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.

SAFECOM and Disaster Management. (n.d.). [Creating a Charter for a Multi-Agency Communications Interoperability Committee: Template and Questions to Consider.](#) U.S. Department of Homeland Security. (Accessed 4/6/2016.)

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.

U.S. Department of Homeland Security. (2014). [National Emergency Communications Plan.](#)

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

U.S. Department of Homeland Security. (2015). [Government Emergency Telecommunications Service \(GETS\).](#)

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.

U.S. Department of Homeland Security. (2015). [Telecommunications Service Priority \(TSP\)](#).

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

U.S. Department of Homeland Security, Office of Emergency Communications. (n.d.). [Office of Emergency Communications Technical Assistance / SCIP Catalog](#). (Accessed 4/6/2016.)

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.

Federal Emergency Management Agency. [Disaster Emergency Communications Division](#).

[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.*