Emergency Management Playbook

A Back-to-Basics Approach to Infection Control and More for Health Care Facilities

Supplemental Infection Prevention and Control Considerations

PROJECT FIRSTLINE
CDC'S National Training Collaborative for Healthcare Infection Prevention & Control

Contents

This document is brought to you by Project Firstline as a supplement to the **Emergency Management Playbook | A Back-to-Basics Approach to Infection Control and More for Health Care Facilities** provided by the American Society for Health Care Engineering (ASHE), available at https://www.ashe.org.

Project Firstline is a national collaborative led by the U.S. Centers for Disease Control and Prevention (CDC) that provides infection control training and education to frontline healthcare workers and public health personnel. The American Hospital Association is proud to partner with Project Firstline, as supported through Cooperative Agreement CDC-RFA-OT18-1802 and CDC-RFA-CK20-2003. CDC is an agency within the Department of Health and Human Services (HHS). The contents of this document do not necessarily represent the policies of CDC or HHS and should not be considered an endorsement by the Federal Government.

1. Overview

Healthcare facilities can face severe and lasting consequences from catastrophic events and public health emergencies, whether within or outside the facility. Examples of internal emergencies include workplace violence or flooding due to stormwater or failures in building water operations. External emergencies include severe weather emergencies and the spread of new or novel infectious diseases. Wherever catastrophic events occur, whether within the facility or at some distant location, healthcare preparedness is critical to disaster medical response.[1] All emergencies have operational and infection control implications that require the collaboration of facility engineers and infection preventionists.[2]

This supplement highlights additional infection prevention and control considerations during an emergency response complementing the American Society for Health Care Engineering's *Emergency Management Playbook | A Back-to-Basics Approach to Infection Control and More for Health Care Facilities* available at www.ashe.org.

2. The Role of the Facility Engineer and the Infection Preventionist

A multidisciplinary Emergency Management Program includes senior and operational leaders within the facility. This supplement focuses on the roles of two leaders—the Facility Engineer and the Infection Preventionist—and how they can collaborate in all mitigation, preparation, response, and recovery stages.[3]

Facility Engineers (FE) know the physical layout of the building better than anyone else. They ensure all facility areas operate according to state and local administrative codes and accepted standards. According to the National Incident Management Structure, the FE plays a crucial role in determining the physical safety of operations throughout the facility.[4] The FE should be prepared to evaluate the continued operations and know how to safely cease and restore operations in facility areas affected by catastrophic events.

The consultative role of an Infection Preventionist (IP) includes evaluating worker safety during their interactions with the environment and with patients or residents of long-term care. When a healthcare environment is experiencing severe challenges, the IP's understanding of the workflow of personnel and the risk of infectious disease can prevent further harm. Actions recommended by IPs may include measures to screen patients and healthcare workers (HCWs) for infection, ways to remediate environmental risks, methods to distribute supplies for maximum adherence, and messages to communicate infection risks to frontline workers and the public. Close collaboration between the IP and Occupational Health Department is needed to manage any infectious disease exposures or injuries that may occur among HCWs during a disaster response.

RESOURCES

- **Crisis & Emergency Risk Communication (CERC) | CDC**
- **Templates and Tools, CERC | CDC**
- **Immediate Response Checklist, CERC | CDC**
- **Event Response Matrix and Assessment Worksheet, CERC | CDC**
- **Emergency Operations Centers and Incident Management Structure | CDC**
- **Emergency Operations Centers (EOC) | Federal Emergency Management Agency (FEMA)**
- **EOC Skillsets User Guide | FEMA**

3. Emergency Planning

Acute care hospitals and long-term care facilities must have emergency management plans.[5,6] These plans are based on local risk assessments and consider ways to prevent, manage, respond to, and recover from any emergency. The facility's ability to adequately prepare for, absorb, recover from, and adapt to an emergency may impact the healthcare system's resilience, allowing the facility to continue operations or rapidly restore them during severe challenges.

The disruption cycle: the four stages of a response over time

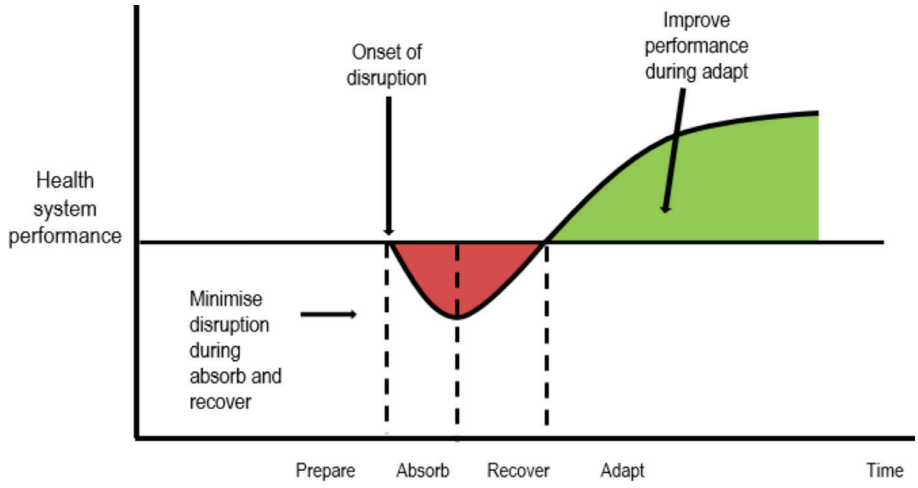

Image from www.oced.org/health/health-system-resilience.htm[7]

4. Critical Areas of Emergency Management

During a disaster response, the healthcare system may move from providing individualized patient care to population care, in which the health of the community and those most likely to be harmed is prioritized. The Emergency Management Program should be prepared to make ethical decisions that seek to administer care equitably. This supplement discusses collaboration between FEs and IPs in the following critical areas:

- Surge Capacity
- Service Priority
- Patient Safety
- Essential Supplies
- Essential Utilities
- Recovery

RESOURCES

- **Emergency Preparedness and Response | CDC**
- **Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings | CDC**
- **Fundamentals of Emergency Management Course | FEMA**
- **Emergency Management | The Joint Commission**

4.1 Surge Capacity

According to Hick et al., "Surge capacity refers to the ability to manage a sudden increase in patient volume that would severely challenge or exceed the present capacity of a facility."[8] The goal of planning and implementation of surge capacity is the ability to provide care to large numbers of people, even under austere conditions.[9] Surges in patient volume may occur without notification due to events like mass casualties. Dynamic incidents, like pandemic respiratory illnesses, may allow for information, providing a healthcare facility an opportunity to monitor for infection. FEs and IPs must collaborate to maintain situational awareness regarding modifications to operational standards. As the event worsens, conventional care may be rapidly altered based on preplanned contingencies, or crisis standards of care may be used in severe conditions. Decision-making about standards of care during a no-notice event is often unstructured, while structured decisions may guide the response during an anticipated event. FEs and IPs should plan for the escalation and de-escalation of an event. The California Hospital Association has developed a surge plan checklist that can help guide FEs and IPs in planning for the immediate response, security, and core requirements for services not usually provided.

RESOURCES

- **Healthcare Surge | California Hospital Association**
- **Surge Planning Checklist | California Hospital Association**
- **Hospital Surge Capacity and Immediate Bed Availability | Administration for Strategic Preparedness and Response (ASPR) Technical Resources, Assistance Center, and Information Exchange (TRACIE)**
- **Hospital Surge Planning Resources | Florida Department of Health**

4.2 Service Priority

The National Fire Protection Association 99: Standard for Healthcare Facilities requires healthcare facilities to establish contingency plans to maintain essential building systems.[10] FEs have in-depth knowledge of these essential systems, including, but not limited to, the electrical system; water supply system; heating, ventilation, and cooling (HVAC); and provision of medical gases (e.g., oxygen). IPs understand that devastating infectious events may occur when these systems are disrupted.

FEs and IPs should collaborate to determine the most effective and safest plans for patient placement, supply conservation, and workforce communication.

RESOURCES

- **Setting priorities in health care organizations: criteria, processes, and parameters of success | BMC Health Services Research**
- **Health care priority setting: principles, practice and challenges | Cost Effectiveness and Resource Allocation**

4.3 Patient Safety

Patient safety and security are the organization's prime responsibility during an emergency. As emergencies develop and the parameters of operability shift, organizations must provide safe and secure environments for their patients and staff. The FE may be charged with overseeing supplemental staffing, including roles like additional security officers. The IP may be responsible for ensuring training in infection control actions for workers not generally responsible for these duties. IPs using targeted surveillance can predict or understand the impact of service disruptions. This surveillance should continue after the event, particularly if patients were moved from units operating under crisis standards, in which standard infection control precautions were altered, and exposure to infectious agents may have occurred. Actions to monitor for and prevent the spread of infections should continue through de-escalation of the event.

RESOURCES

- **Patient Safety | CDC**
- **Patient Safety | The Joint Commission**

4.4 Essential Supplies

Essential supplies include personnel protective equipment (PPE) and other durable medical equipment like ventilators needed to manage patient care. Many hospitals have developed systems for "just in time" distribution of supplies. When the supply chain is disrupted or more significant than average volumes of goods may be delivered, the FP and IP may be called upon to determine delivery and storage sites. When supplies are substituted, IP expertise is needed to verify that they meet standards equivalent to the store that is being replaced. A supply change often requires "just in time" training to ensure usage aligns with the new product.

PPE protocols have long been established in healthcare facilities, but the role of facility engineers and environmental services (EVS) in implementing operational changes and developing logistics involving PPE has expanded, especially in light of the COVID-19 pandemic. Hospitals should prepare for potential resource scarcity by developing methods to conserve essential supplies and implementing strategies for space, supplies, and staff shortages. Conservation strategies that call for the use of supplies not consistent with the manufacturer's instructions, such as the reuse of isolation gowns, must be implemented carefully and should return to conventional use as soon as the supply chain has normalized. Communication with healthcare workers regarding changes in practices and return to traditional use should be provided throughout the event.

During an emergency, it is not uncommon for day-to-day maintenance, such as trash pickup, to be performed at longer intervals due to staffing issues and evolving staff priorities. It is essential to ensure adequate receptacle capacity and frequent enough pickups of used disposable PPE from each unit. Consider including PPE disposal intervals specific to the amount of PPE used in each area during an emergency to ensure receptacles do not become overfilled. Protocols for collecting and cleaning reusable PPE, such as PAPR and reusable isolation gowns during periods of surges or disruptions should be developed.[11]

RESOURCES

- **Personal Protective Equipment Use Tracking Tools | NIOSH | CDC**
- **Strategies for Conserving the Supply of all Personal Protective Equipment in Healthcare | NIOSH | CDC**
- **Strategies for Conserving the Supply of N95® Filtering Facepiece Respirators | NIOSH | CDC**
- **Strategies for Conserving the Supply of Medical Masks | NIOSH | CDC**
- **Strategies for Conserving the Supply of all PPE in Healthcare | NIOSH | CDC**
- **Strategies for Conserving the Supply of Isolation Gowns | NIOSH | CDC**
- **Strategies for Conserving the Supply of Eye Protection | NIOSH | CDC**
- **Strategies for Conserving the Supply of Disposable Medical Gloves | NIOSH | CDC**
- **CDC Publishes Instructions for Optimizing Disposable Glove Supply | American Industrial Hygiene Association (AIHA)**
- **Conserving Supplies of PPE in Healthcare Facilities during Shortages | NIOSH | CDC**
- **Proper Respirator Use, Storage, Maintenance, Repair, Disposal | NIOSH | CDC**
- **Hierarchy of Controls | NIOSH | CDC**

4.5 Essential Utilities

Planning around the management of vital utilities, such as electrical power, potable water, ventilation, and fuel, must be included in a hospital's Emergency Management Programs.[12] The FE has experience managing alarm systems, electrical backup power, elevators, medical gases, waste and debris, and water delivery and portability. When disruption to any utility systems occurs, the FE and IP should take action to protect patients and healthcare workers from exposure to contaminated materials. Disruption to the electrical system is likely to result in refrigeration loss, and water disruption may result in the loss of steam or boil water orders. Responses may include discarding food not maintained at safe temperatures and water testing to ensure compatibility with sterilization equipment. Flooding that damages wall boards can create a moist environment for mold. The FE and the IP work together to determine when material replacement should be undertaken and perform infection control risk assessments before initiating repairs.

When water damage has occurred, manufacturers may need to be contacted regarding the appropriate damage assessment for their equipment or instruments, as well as specific cleaning and disinfection methods. Water can adversely affect electronics, and moisture trapped inside a piece of equipment may trigger the development of rust. Do not connect wet electronic equipment to electricity.

Regional disaster planning initiatives may be developed with standing agreements among area hospitals to aid one another in the restorative cleaning and reprocessing instruments, devices, and supplies. Hospitals not impacted by disaster damage may help by offering their central sterile supply or laundry services while affected hospitals restore their reprocessing capacity.

RESOURCES: ELECTRICAL SYSTEMS

- **Hospital Backup Power Plan - Understanding NFPA 110 | AKCP**
- **Healthcare Facilities and Power Outages | FEMA**
- **Prioritizing Resilience: Best Practices on Energy Resilience for Healthcare Facilities | National Governors Association**
- **Utility Failures in Health Care Toolkit | ASPR TRACIE**

- Emergency Power Systems for Critical Facilities: A Best Practices Approach to Improving Reliability | FEMA
- Six Steps to Creating an Effective Emergency Response Plan [+ Template] | AlertMedia
- Emergency Response Plan: A Guide to Getting Ready for Anything | SafetyCulture
- Planning Guides | FEMA
- Sample Emergency Operations Plans | U.S. Environmental Protection Agency (EPA)

RESOURCES: VENTILATION SYSTEMS

- Ventilation in Buildings | CDC
- Ventilation strategies for mitigating airborne infection in healthcare facilities: A review and bibliometric analysis (1993–2022) | Energy and Buildings
- Air, Guidelines for Environmental Infection Control in Health-Care Facilities | CDC
- Ventilation of Health Care Facilities | American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)
- Updated Guidelines for Design and Construction of Hospital and Health Care Facilities | Newcomb & Boyd

RESOURCES: WATER SYSTEMS

- Healthcare Facility Water Management Program Checklist | CDC
- Healthcare-Associated Infection (HAI) Outbreak Toolkit | CDC
- Tap Water Quality and Infrastructure Discussion Guide for Investigation of Potential Water-Associated Infections in Healthcare Facilities | CDC
- HAI Prevention Toolkits | CDC
- Healthcare Water System Repair and Recovery Following a Boil Water Alert or Disruption of Water Supply | CDC
- Emergency Water Supply Planning Guide for Hospitals and Healthcare Facilities | CDC
- Requirement to Reduce Legionella Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Diseases | U.S. Department of Health & Human Services
- Federal Requirement to Reduce Legionella Risk | CDC
- Developing a Water Management Program to Reduce Legionella | NSF
- Reduce Risk from Water | CDC
- Tools for Effective Water and Wastewater Utility Management | U.S. EPA
- Effective Water Utility Management Practices | U.S. EPA

RESOURCES: WASTE MANAGEMENT

- Regulated Medical Waste | CDC
- Updates to Environmental Infection Control Guidelines | CDC
- Health Hazards of Medical Water and its Disposal | Energy from Toxic Organic Waste for Heat and Power Generation

- **Biomedical Waste and Solid Waste Management in the Time of COVID-19: A Comprehensive Review of the National and International Scenario and Guidelines | Journal of Laboratory Physicians**
- **Links to Hazardous Waste Programs and U.S. State Environmental Agencies | U.S. EPA**

RESOURCES: FLOODING

- **Healthcare Water System Repair and Recovery Following a Boil Water Alert or Disruption of Water Supply | CDC**
- **Environmental Infection Control Guidelines | CDC**
- **Guidelines for Environmental Infection Control in Health-Care Facilities | CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC)**
- **Emergency Disinfection of Drinking Water | U.S. EPA**
- **Recommendation for the Cleaning and Remediation of Flood-Contaminated HVAC Systems: A Guide for Building Owners and Managers | NIOSH | CDC.**
- **Comprehensive Guide to Steam Sterilization and Sterility Assurance in Health Care Facilities | Association for the Advancement of Medical Instrumentation (AAMI)**

RESOURCES: FIRE

- **Hospitals Don't Burn! Hospital Fire Prevention and Evacuation Guide | Institutional Repository for Information Sharing | Pan American Health Organization**
- **Standard on Mass Evacuation, Sheltering, and Re-entry Programs | National Fire Protection Association (NFPA)**
- **Standard for Emergency, Continuity, and Crisis Management: Preparedness, Response, and Recovery | NFPA**
- **Health Care Facilities Code | NFPA**
- **Life Safety Code & Health Care Facilities Code Requirements | Centers for Medicare & Medicaid Services (CMS)**
- **Life Safety Code | NFPA**
- **Guide for Emergency Medical Services and Systems | NFPA**
- **Guide for Community Health Care Programs | NFPA**

4.6 Recovery

Disaster recovery is considered a subset of business continuity, explicitly focusing on supplies, utilities, and systems that support critical operational functions as soon as possible after a disruptive event occurs. Recovery is the longest stage of any disaster. Surveillance for patient or healthcare worker infections should continue by the Infection Prevention Department until the facility has fully recovered or until exposures to infectious diseases are eliminated and the incubation period for potential infectious diseases has passed.

RESOURCES

- **Remediation and Infection Control Considerations for Reopening Healthcare Facilities Closed Due to Extensive Water and Wind Damage | CDC**
- **Checklist for Infection Control Concerns When Reopening Healthcare Facilities Closed Due to Extensive Water and Wind Damage | CDC**

5. Case Studies

For a hospital to survive and thrive during a crisis, it depends on its ability to bend quickly without breaking and in ways that benefit the community. Like in the performing arts, healthcare improvisation isn't about guessing but preparing. These case studies examine efforts taken by healthcare facilities during the COVID-19 pandemic to adapt to surges of patients with infectious diseases. Lessons learned from the pandemic can be applied to future emergencies.

Baltimore Convention Center Field Hospital: One State's Experience during COVID-19

From ASPR TRACIE

This brief paper describes excellent coordination between the State of Maryland and major health systems, resulting in the successful creation of alternate care sites.

The Baltimore Convention Center was identified as an available and suitable structure for use as a field hospital. This ACS increased hospital capacity by accepting convalescing non-intensive care patients with COVID-19 and complicated medical and surgical conditions that do not allow them to be cared for at home.

Decision-making, design, operations, staffing, training, and financial and administrative considerations are discussed.

The Joplin Tornado: The Hospital Story and Lessons Learned

From ASPR TRACIE

This slide presentation focuses on the healthcare impact of an unexpected natural disaster, including the response and recovery. This slide show describes lessons learned from the event to the redesign and completion of a new hospital in 2015.

Regional Health System Response to the Virginia Tech Mass Casualty Incident

Lisa Kaplowitz et al.; Published online by Cambridge University Press: April 2013

This paper describes the successful response to a mass casualty incident resulting in low overall mortality of victims. The benefit of regional collaborative planning, training, and exercising, as well as collaboration among all facility departments, resulted in increased expertise, improved communications, and a sense of trust among responders.

6. References

- Emergency Management Playbook: A Back-to-Basics Approach to Infection Control and More for Health Care Facilities | American Society for Health Care Engineering (ASHE)
- APIC Creates Emerging Infectious Disease 'Playbooks' | Association for Professionals in Infection Control and Epidemiology
- Emergency Management in Health Care: An All Hazards Approach, 5th edition | The Joint Commission
- Emergency Management Professional Program | FEMA
- The CLEAR Field Guide for Emergency Preparedness | AHA
- Emergency Management | The Joint Commission
- Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings | CDC
- List of ASME Codes & Standards | The American Society of Mechanical Engineers (ASME)
- Natural Disasters and Severe Weather | CDC

Endnotes

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