BIOLOGICAL INCIDENTS

Introduction

Biological incidents requiring an emergency management response span a wide range of impacts and scenarios. They can be naturally occurring, imported via travelers, domestically acquired, or caused by terrorists. They can involve a single person with a suspected special pathogen infection or a worldwide pandemic. Regardless of their cause or scope, hospital emergency managers partnering closely with infection prevention and control staff can ensure plans for biological emergencies build on daily practices. This includes following the "identify, isolate, inform" framework for initial recognition and management of infectious diseases and adhering to the hierarchy of infection prevention controls to protect the workforce and patients from exposure.

Chapter Quick Links

Global interconnectedness contributes to the potential for a patient infected with a special pathogen to present to any hospital. Even a single suspected case of some diseases will require a robust infection prevention and incident management response over multiple days to:

- Coordinate patient testing and treatment.
- Identify case contacts (including in the hospital) based on characteristics of the pathogen, stage of patient illness, location of exposure, and susceptibility of the population.
- Coordinate quarantine and isolation of contacts and cases.
- Determine immune status of contacts.
- Determine relevant prophylaxis or vaccination among contacts.
- Manage decedents.
- Coordinate communication with the patient and their loved ones, providers, the community, and the media.

As the number of cases and the duration of the response grows, the role of emergency management is central to handling demands on the hospital and coordinating care for patients, staff, and the community at large.

Related Resources

Additional materials are available on ASPR TRACIE's Infectious Diseases Resource Page.

Regular, informative internal and external information management are key to managing biological incidents. Generally, the agents of disease are unfamiliar, inaccurate information is common, and

targeted strategies to address the concerns and needs of specific populations may be needed. Therefore, it is important for hospitals to coordinate their public communications with their jurisdiction's public health department and any joint information systems to provide messaging that is consistent, accurate, and reinforces desired outcomes and actions.

This chapter reviews the hierarchy of controls and the identify, isolate, inform framework and details some considerations for epidemics and pandemics, special pathogens, and bioterrorism (with an emphasis on anthrax).

Hierarchy of Controls

The hierarchy of controls developed by the National Institute for Occupational Safety and Health offers a framework to provide mitigation strategies for those in a hospital from exposure to biological and other hazards. The five controls listed from most to least effective are:

1. **Elimination:** Removing the hazard.
2. **Substitution:** Replacing the hazard with something less harmful.
3. **Engineering:** Reducing exposure to the hazard through physical changes to the environment.
4. **Administrative:** Reducing exposure to the hazard through changes in work practices, policies, and procedures.
5. **Personal protective equipment (PPE):** Reducing exposure to the hazard through proper use of effective PPE.

Elimination and substitution have limited applicability as controls for biological hazards in hospitals, though vaccination may play a role in elimination depending on the infectious agent and the availability of an effective vaccine.

A combination of engineering controls, administrative controls, and PPE may substantially decrease exposure risks and help minimize disease transmission in hospitals. A common engineering control is appropriate use of airborne infection isolation rooms (AIIR). Maintaining a well-functioning heating, ventilation, and air-conditioning (HVAC) system, installing high-efficiency particulate air (HEPA) filters, and managing air flow by closing or opening dampers, doors, and windows are other basic engineering controls applicable to biological threats. Administrative controls include adhering to established infection prevention and control practices, establishing and enforcing workforce policies to limit disease transmission, enabling safe hand and respiratory hygiene practices, ensuring effective cleaning and disinfection practices are followed, and implementing access controls and other limitations on movement in the facility. All employees who may come in contact with infected patients should receive training in proper use and disposal of PPE and be issued PPE appropriate for their risk of exposure. Specific engineering, administrative, and PPE controls appropriate to the type of biologic emergency are mentioned throughout this chapter.

Identify, Isolate, Inform

One of the most important administrative and engineering controls to prevent and manage biological threats is the identify, isolate, and inform framework.

- **Identify:** Patients potentially infected with a biological agent of concern can present at any time to any hospital. Emergency department, clinic, and other staff in public-facing roles should be trained to routinely ask specific questions about the presence of cough, fever, rash, and relevant domestic/international travel in the past month. Screening questions can be tailored and increased when known local or international cases increase the risk of exposure to specific pathogens. Ideally, these questions are embedded in the electronic health record (EHR) and can be adapted or added to as needed. During known outbreaks, signage can be placed at entrances to encourage patients to report relevant signs, symptoms, and travel history.
- **Isolate:** All patients with respiratory symptoms should be asked to mask for source control. When screening identifies a possible infectious case, clear policies should be in place to determine where to rapidly place the patient to avoid further exposures. Ideally, this is an AIIR but, depending on the hospital's capabilities, another space may be designated where additional assessment can occur to risk-stratify the patient and start any initial assessment and treatment. Patient rooms with a private bathroom are also ideal.
- **Inform:** At a minimum, on-call infection prevention staff should be notified of a suspect case. In many instances, the infection preventionist will then notify appropriate individuals and agencies (e.g., infectious disease consultant, public health agency, laboratory, hospital leadership, healthcare coalition, regional treatment centers). In some cases, the patient's provider will be asked to make notifications and obtain consultation. Hospital infection prevention policies should specify this process.

Epidemic/Pandemic Response

A wide range of infectious diseases can generate severe hospital strain conditions. Outbreaks of measles in susceptible communities and surges of seasonal respiratory illnesses are examples of epidemics requiring an emergency management response. Even in pandemics, there can be variation in the resources and actions needed. The 2009 H1N1 pandemic had a modest impact on hospital services while the COVID-19 pandemic resulted in multiple waves of illness that pushed some health systems into crisis. All hospitals should be prepared to follow the identify, isolate, inform framework and implement additional layers of controls appropriate to the biological agent and the situation.

When the hospital becomes aware of a potential epidemic or pandemic threat, it should prioritize staff education about the pathogen, its clinical presentation and course, and required infection prevention strategies. The PPE (e.g., respirators or masks, gowns, gloves) required when caring for patients with most epidemic or pandemic-capable illnesses should be familiar to staff and readily available in clinics and emergency departments, though quantities may be

insufficient for the duration of a pandemic. Infection prevention personnel should provide just-in-time training and quick reference materials if effective strategies are not well known to staff.

Related Resources

Information on establishing alternate sites for patient surge is available in ASPR TRACIE's Considerations for the Use of Temporary Surge Sites for All-Hazards Incidents and Alternate Care Sites Topic Collection.

Depending on the pathogen and community disease prevalence, screening of all staff and persons entering the hospital campus may be required. Early screening in the patient intake process should direct those with potential symptoms to designated areas for care, if possible. Validating correct use of PPE by all staff and visitors (and limiting the number of visitors) can help reduce exposures and control spread. In some cases, designated clinics, floors, and even facilities may be used to help dedicate care resources and improve isolation.

Early situational awareness of epidemics and pandemics should allow the hospital to calibrate its strategies and tactics. Implementing Incident Command and establishing incident action planning cycles and command staff rotation is important to pace the response, particularly during pandemics. Many hospitals struggled during the COVID-19 response deciding whether to keep the incident command system (ICS) structure and functions active between waves. Following initial activation of ICS during pandemics or extended epidemics, the Incident Commander can work with the section chiefs to determine whether the structure will be ongoing or may be optionally demobilized at times when the hospital is operating in conventional status (i.e., has returned to its "normal" operations).

A variety of surge strategies may need to be implemented. Depending on the severity of the epidemic or pandemic, different service lines may be disproportionately affected. Incident Command should have a regular process for examining epidemiologic data, current and past patient volume information, and available space, staff, and supplies to tailor the surge strategies to the conditions. The expansion of virtual care/telemedicine for patient encounters and expert consultation should be a priority to prevent symptomatic patients from presenting to the hospital campus and to provide in-place consultations when a patient should not or cannot be moved. Hospitals should also ensure that "hospital-at-home," homecare, and palliative care services within the health system or operated by partners are planning for service augmentation to support larger volumes of clients and discharge of patients with more advanced needs.

Related Resources

Additional resources are available in ASPR TRACIE's Virtual Medical Care and Homecare and Hospice Topic Collections.

Robust liaison with the public health agency and other hospitals in the area (ideally through a healthcare coalition) is critical to obtaining the agent and epidemiologic information needed to plan the healthcare response. A mechanism for receiving and distributing health alerts and other situational awareness information (including off-hours) will ensure the relevant operational areas in the hospital are aware of updates. At times, the volume of updates may be such that Incident Command at the hospital will need to consolidate information and adjust

distribution so that personnel are not overwhelmed but are alerted of key changes and issues requiring action. Further, some information from public health agencies or other local, state, or federal authorities may require leadership discussion to determine the actions to be taken (e.g., if PPE or infection prevention recommendations change) prior to the release of information to hospital staff.

Depending on the incident, public health or emergency management agencies may have authorities to support the healthcare response. This may include provision of supplies, regulatory or liability relief, support for Centers for Medicare & Medicaid Services (CMS) 1135 waivers to compensate care provided in non-traditional locations, and policy and guidelines to support clinical care. The hospital should be aware of any legal and regulatory protections available through state public health emergency or disaster declarations and advocate for facility and provider relief as required to support the necessary adaptation to circumstances.

Related Resources

Additional resources can be found on ASPR TRACIE's Crisis Standards of Care and Medical Product Shortages and Scarce Resources pages.

The hospital will need to closely monitor the care being provided and adapt guidelines (e.g., criteria for admission to certain hospital units) as required to best address the demands of the epidemic. Depending on the state and situation, crisis standards of care plans may be invoked to provide a structured response to resource allocation. Crisis standards of care and resource allocation plans should be used to ethically address shortages and ensure Incident Command receives clinical input, develops action plans, and supports provider allocation decisions that are consistent with available guidance. This may include prioritization for access to vaccines and therapies based on risk and prognosis. Authorities vary widely by state; hospitals and healthcare coalitions should understand these clearly prior to an incident.

Resource shortages—in space, staff, or supplies—can impact patient care and fluctuate during pandemics and some epidemics. The hospital should work in conjunction with other hospitals, their local healthcare coalitions, and the state to understand the degree of impact and available guidelines for allocation of resources and to help monitor and coordinate patient loads and transfers (through mechanisms such as Medical Operations Coordination Centers [MOCCs]). This collaboration helps maintain access to care and as consistent a standard of care in the region as possible. The state should have a process for developing guidance and hospitals should be prepared to support onsite vaccination of staff and offer priority access to services and treatments judged ethically appropriate.

From the Field

During the 2022-2023 pediatric respiratory illness surge, all pediatric acute and critical care beds in Washington were 135-150% over capacity. The statewide MOCC managed 171 requests, with 100% accepted within 3 hours of the initial call.

Depending on the number of patients, the pathogen, and the type of transmission, hospitals may need to request access to regional, state, or federal supply caches and logistical assistance from their healthcare coalition.

Staffing issues are critical during extended epidemics and pandemics and can lead to decreased ability to work and increased attrition. Measures that increase staff safety at work (e.g., the provision of safe and effective PPE and the ability to manage and monitor patients remotely rather than changing PPE multiple times) are helpful. Equally important are measures to support personnel psychologically. Use of buddy systems and other peer support is important as is the availability of professional psychological support. Frequent, transparent communication from hospital leadership is key to maintaining trust and sense of mission. Guidelines for significant changes in care should be provided, and standard work created whenever possible. Severe emotional distress due to fears about the disease, worries about impacts on loved ones and finances, anxiety due to unfamiliar responsibilities, and moral distress due to the inability to provide conventional levels of care is common during pandemics and must be prevented to the degree possible and addressed as needed. These stressors are dynamic and have differential impacts on staff based on personal history and experiences.

Related Resources

ASPR TRACIE's Disaster Behavioral Health Resource Page has additional resources, including Helping the Helpers: Building Disaster Resilience and Pandemic Workforce Well-being: Recognizing Stressors and Supporting Our Own.

Epidemics and pandemics usually exacerbate existing health disadvantages. Hospitals should be deliberate in analyzing their at-risk populations and determining where impacts may disproportionately occur and how they may be mitigated through provision of information, access to care (which may involve transportation, technology, testing availability, and care capacity issues), and different strategies for distributing countermeasures or administering vaccines. Targeted strategies will be needed to improve healthcare delivery and disease prevention in at-risk populations.

Special Pathogens

Even a single patient suspected of being infected with certain special pathogens can strain a hospital. Ideally, hospitals should develop a playbook for the initial placement and care, testing, treatment, contact tracing, isolation, and public health considerations for key pathogens or groups of pathogens (e.g., avian or novel influenza, viral hemorrhagic fever [VHF]).[1] The U.S. has developed a National Special Pathogen System (NSPS) to coordinate care for special pathogen patients. The NSPS framework is supported and operationalized by the National Emerging Special Pathogens Training and Education Center (NETEC), which maintains a wide array of valuable education and training resources and consultative services. The NETEC also validates and provides support for special pathogen treatment centers. Hospital emergency managers should know what level their facility is in the tiered NSPS system of care:

[1] Frontline Hospital Planning Guide: Special Pathogens is an example of such a playbook.

- **Level 1 (Regional Emerging Special Pathogen Treatment Centers [RESPTCs])**: Regional treatment centers capable of delivering specialized care to multiple patients of all ages and acuities for the duration of their illness. (Note: The responsibilities of RESPTC staff are extensive and beyond the scope of this chapter.)
- **Level 2 (Special Pathogen Treatment Centers [SPTCs])**: Facilities capable of delivering specialized care to clusters of adult and/or pediatric patients for the duration of their illness.
- **Level 3 (Assessment Centers)**: Facilities capable of basic laboratory testing, stabilization for 12-36 hours, and coordination of rapid patient transfer to a Level 1 or 2 facility.
- **Level 4 (All Other Healthcare Facilities)**: Facilities that can identify, isolate, inform, and initiate stabilizing care, protect staff and other patients, and arrange timely patient transport.

Hospital emergency managers should understand their regional treatment resources for special pathogens and what types of patients will be referred to other hospitals for care. Further, the role of the hospital dictates the policies and procedures that need to be in place and guides supply planning.

Related Resource

The Disaster Available Supplies in Hospitals (DASH) Tool may be helpful to estimate PPE stocking needs based on the hospital role and capacity. If regional caches of PPE exist, the assets, criteria for access, process for access, and obligations for restocking should be understood prior to an incident.

Once a suspect special pathogen case is identified, the hospital should be able to consult with infection prevention and infectious disease experts to determine next steps. If not available onsite, consultation should be available within the health system or from a referral or regional treatment center. This can be invaluable in determining testing and treatment strategies and identifying key areas of focus for managing healthcare worker risk. In particular, care of patients suspected or confirmed to be infected with a VHF will require engineering and administrative controls and enhanced PPE, including eye protection, head covers, waterproof gowns, and, often, powered air-purifying respirators (PAPRs) and an observer to monitor doffing of PPE for cross contamination.

Ideally, an infection preventionist should be able to respond to the care area to assist with implementing and monitoring infection prevention procedures and coordinating with the care team. Generally, a suspected case of a high-profile special pathogen should prompt at least partial activation of the hospital's ICS so that lines of communication and authority are well-defined and internal and external communications can be coordinated with public health. A suspected or confirmed special pathogen case may generate widespread public and media interest; the hospital should be prepared for this likelihood.

Designated isolation spaces should be available for patient care, ideally with anterooms or adjacent space that can be used for donning/doffing and waste storage. In some cases, movement of the patient may be required from their initial isolation space to an area more suitable and away from other patients. This movement process and route should be planned ahead of time to avoid exposure to other personnel and patients.

All hospitals should have acute care (e.g., emergency department) personnel who are trained to provide ongoing supportive care to a special pathogen patient. Even Level 4 hospitals may need to provide stabilizing care for hours awaiting specialized transportation or test results. Initial and refresher training should be supplemented by just-in-time resources including step-by-step pictorial instructions for donning and doffing PPE, sample collection, and other key processes. Training and frequent communication are essential to reassure staff about their safety. For novel pathogens, staff should understand that case definitions and guidelines may change as more information is learned about the course of illness and protective actions needed.

Many hospitals have special pathogen response team personnel with additional training who are called in when a suspect case presents, particularly VHF patients. These teams may be trained on the use of PAPRs and other types of PPE, use of point-of-care clinical testing, performing interventions safely (e.g., intravenous access, airway management), waste disposal/control, and the safe transfer of the patient to a transport team/transport pod.

In most cases, clinical and reference/public health laboratory testing will be required to confirm the pathogen. The hospital should have plans for the safe collection, transport, and handling of specimens. For suspected VHF cases, point of care testing should be emphasized as blood samples should not be run on multi-sample analyzers. Many common hospital laboratory tests require additional training and significant adaptations to normal processes when performed on special pathogen samples. Not all hospital laboratories have the capability to safely perform these tests. The hospital laboratory should perform a risk assessment to determine what tests can safely be performed onsite, particularly at the bedside to assess electrolytes, coagulation function, and other basics. Malaria and, in some cases, dengue fever testing can be very helpful but presents additional risk and planning considerations. Specific testing for VHF is usually done at a public health reference lab. The packaging process for these samples should be clearly documented and kept with the packaging materials. The hospital should understand local and state laboratory testing capabilities, the sample submission process, and turnaround time (including off-hours and weekends) for various special pathogens including H5N1, Ebola, and Marburg virus.

Waste management and disposal poses a particular issue for suspected VHF patients. In general, the waste must be handled as Category A until testing returns negative.[2] Hospitals typically should sequester generated waste onsite until testing is complete to avoid the complexities of Category A disposal unless truly required. Special containment measures in the patient care area coupled with a designated secure storage area are necessary while awaiting test results. Used PPE generates large volumes of waste that require temporary storage. The

From the Field

In 2024, a deadly case of travel-acquired Lassa fever in Iowa required the identification and risk assessment of 180 contacts, including healthcare personnel from three hospitals, three EMS units, six laboratories, and three postmortem care workers. No additional cases were identified during the investigation.

[2] Additional information on special waste handling requirements is available in Managing Solid Waste Contaminated with a Category A Infectious Substance.

hospital must either have a contract with a licensed disposal contractor or understand the applicability of jurisdictional or state contracts prior to a case presenting. The care team should also have a process for the management of bodily fluids. This is greatly facilitated when there is a toilet in the patient care area. Infection prevention staff should have pictorial instructions and just-in-time training available to address both general and bodily fluid waste management.

In the event that a confirmed VHF patient dies at the hospital, special handling of the remains is required involving multiple body bags and, ideally, a heat-sealing process. The hospital should have a process in place to address this situation with its own resources or via an agreement to bring in personnel and supplies from a regional treatment center or the NETEC to assist.

Bioterrorism

As with special pathogens, even a single patient from a suspected bioterrorism incident can strain a hospital's resources. The hospital will need to activate ICS to manage resources, plan response activities, and coordinate messaging with jurisdictional authorities. Bioterrorism incidents also require coordination with law enforcement to gather and preserve evidence of criminal activity.

White Powder Incidents

"White powder" incidents are relatively common and may result when there is an inadvertent leak of material or a deliberate attempt to terrorize, particularly through the use of mailed items. Though the mail-based anthrax attacks of 2001 demonstrate the potential risk, most white powder incidents will be inert substances.

For internal incidents, including in mail-handling areas, the hospital should plan for isolation of the area, decontamination of affected individuals, interface with responding law enforcement and fire department agencies, and liaison with state testing laboratories.

Related Resources

Additional resources are available in ASPR TRACIE's Hospital Patient Decontamination Topic Collection.

Ideally, victims of external powder exposures would be decontaminated at the incident site and require no further immediate medical care. However, concerned victims may self-refer to the hospital. Because the substance is generally unknown, the patients should contain their clothing in sealed bags and wash exposed areas with soap and water. Some patients may require assistance, and hospital decontamination team members should wear their standard hazardous materials (HAZMAT) decontamination ensemble including a PAPR or other particulate respirator as protection against inhaling the powder. If a hooded PAPR is not used, goggles should be added for eye protection.

Victims experiencing acute symptoms should be assessed for conditions such as asthma and chemical toxidromes, as a biologic agent exposure should not cause immediate symptoms. Generally, these patients require no treatment. The regional poison control center should be contacted for advice for all symptomatic patients. After obtaining contact information, the

patients may be discharged after ensuring that scene samples have been tested/are being sent for testing. Prophylaxis should only be provided in the unlikely event the substance is confirmed to be anthrax or another biological agent with an effective countermeasure.

Case Detection

In some cases, hospitals may be notified about a potential bioterrorism agent detected by sensors used routinely by the U.S. Postal Service or to detect threats at special events (e.g., political conventions, high profile sporting events). These environmental monitoring systems may detect the pathogen at or close to the time of dispersion. Hospitals should be aware of local monitoring systems and their role. If a potential bioterrorism incident is detected early, there is a much larger window to prophylax the exposed population and limit the number of clinical cases, sparing the healthcare system potentially catastrophic impacts.

More often, a bioterrorism incident will be detected clinically, usually based on case clusters that indicate the potential for anthrax, botulism, smallpox, or other diseases. Any suspected case(s) should be immediately reported to the relevant public health authority, poison control center, and hospital infection preventionist. States mandate reporting to public health of any confirmed case of the pathogens considered major bioterrorism risks.

In addition to maximizing general surge capacity plans, the hospital must plan for the following bioterrorism incident-specific issues:

1. **Pathogen-based infection prevention and care:** Most pathogens that are likely agents of bioterrorism are not familiar to hospital staff.[3] Just-in-time education, order sets, and education about the transmission of the agent needs to be rapidly developed and circulated. Standard work should be created for patient care to help staff understand the course of the disease, common complications, and factors that portend poor prognosis. Education on infection prevention and PPE must also be rapidly provided. Fortunately, though anthrax has been produced in mass quantities as a bioweapon and is durable in spore form, it is not transmitted person-to-person.
2. **Request and receipt of Strategic National Stockpile (SNS) assets:** Large inventories of antibiotics, monoclonal antibodies (mAbs), ventilators, and other supportive materials to care for victims of bioterrorism are available through the SNS with push packs of initial supplies able to be mobilized within 12 hours of an approved request. Hospitals should understand their critical care surge capabilities and have plans with the state to make rapid requests for additional supplies appropriate to the bioterror agent. For an anthrax attack, this includes not only prophylactic antibiotics for staff (and family members) but also the necessary patient treatment supplies, including additional antibiotics, ventilators, and mAbs. Depending on the scale of the incident, early requests through the state for Federal Medical Station (FMS) assets for community-based alternate care sites and staffing for these sites from Disaster Medical Assistance Teams (DMAT) and other personnel resources

[3] CDC Category A bioterrorism agents include anthrax, botulism, plague, smallpox, tularemia, and viral hemorrhagic fevers.

through the U.S. Department of Health and Human Services are also critical as there are inherent delays in deploying these federal assets.

3. **Prophylaxis:** Hospitals may need to prophylax staff and their family members, depending on the bioterror agent and the availability of an effective countermeasure. Hospitals should have a closed point of distribution (POD) plan. That is, the hospital receives prophylaxis and/or vaccine from the public health agency only for its staff and their families and is responsible for distributing them in concordance with the epidemiologic information available. Hospitals should have a plan to use space in or near the facility that is not otherwise designated for clinical care. Infection prevention and emergency management staff should work with the local public health agency to estimate the number of employees and family members, the staffing and flow needs of the distribution plan, record-keeping, and dispensing/pharmacy issues.
4. **Antibiotics:** All symptomatic anthrax patients must receive antibiotics. Inpatient treatment involves at least two antibiotics (e.g., ciprofloxacin plus doxycycline) with a third added if meningitis is suspected or confirmed e.g., meropenem).[4] Although hospitals routinely administer these antibiotics, they may not have them in sufficient quantity. SNS assets can supplement hospital supplies.
5. **Antitoxin administration:** For anthrax incidents, every symptomatic patient should receive *both* antibiotics and antitoxin, usually in the form of mAbs from the SNS, as soon as possible to prevent progression of disease. Antitoxin treatment is usually provided on an inpatient basis; however, it is likely that inpatient capacity will be inadequate following a large-scale anthrax attack. Outpatient antibiotics are oral and easy to distribute. Outpatient treatment with mAbs, however, requires intravenous administration. Because antitoxin is advised for all symptomatic patients, these infusions will likely be required for many patients with early/moderate symptoms. Administration in the emergency department is not logistically feasible due to the duration of infusion and monitoring. Hospitals should plan with the healthcare coalition and other local partners to determine potential locations for mAb administration and ensure there are mechanisms to get patients to those sites rapidly. This may involve use of infusion centers and ambulatory surgery areas at the hospital as well as community-based clinics and ambulatory surgery centers or other sites. The process of managing mAb administration, including cold-chain receipt of the product, allocation to the health systems, and rapid scaling of administration is often missing from hospital and community/healthcare coalition bioterrorism plans; having a process may help prevent large numbers of patients with progression of critical illness.

Related Resources

ASPR TRACIE's Mass Distribution and Dispensing/Administration of Medical Countermeasures Topic Collection has resources to help hospitals with their planning.

[4] Bower, W., Hendricks, K., Pillai, S., et al. (2015). Clinical Framework and Medical Countermeasure Use During an Anthrax Mass-Casualty Incident. Morbidity and Mortality Weekly Report. 64(4):1-22.

Bioterrorism incidents are particularly challenging as the window for determination of the population at risk in time to provide prophylactic antibiotics and prevent progression to clinical illness is very narrow. Once clinical cases start presenting, every hour that passes without getting prophylaxis to the exposed population means additional victims for the healthcare system to accommodate. Thus, the healthcare system relies on public health-based prophylaxis efforts to prevent as much illness as possible and has a vested interest ensuring those plans are robust.

The logistic challenges that even a small-scale aerosolized bioweapon attack pose for the healthcare system are profound. In fact, short of a nuclear detonation, there are few disaster scenarios that require the number and scope of simultaneous efforts among healthcare, public health, EMS, and emergency management to successfully respond to the incident. External resources must be requested and integrated seamlessly into a response that may be expanding dramatically and placing unprecedented demands on healthcare resources.

Following a successful bioterrorism attack, hospitals can expect to maximally implement their surge capacity plans across a variety of service lines. Several challenges must be addressed *concurrently* to address the volumes of:

From the Field

Bioterrorism incidents require a coordinated response from hospitals and other healthcare providers, public health, and emergency management. The 2001 anthrax attack resulted in 23 cases and 5 deaths. About 32,000 people began postexposure prophylaxis, with a 60-day course recommended for more than 10,000 people.

- **Ambulatory patients who require expansion of acute/emergency services including screening for symptoms and environmental/location exposure that meets the case definition**: Outpatient and telemedicine capacity should be quickly scaled up. Templated charting and prescriptions will likely be needed. Onsite dispensing of prophylaxis/early treatment antibiotics is encouraged, including the use of federal assets (though the focus for prophylaxis should be community-based public health dispensing locations).
- **Patients requiring hospitalization:** Many hospitalized patients will require critical care services. Critical care will need to overflow into contingency and then crisis areas and many patients who would normally be hospitalized will have to be managed as outpatients.
- **Callers seeking information on prophylaxis, epidemiology, and screening/treatment:** The hospital should have plans for an "auto-answer" or other contingencies that can re-direct these calls to a community-based hotline. Additional operators will be needed to manage higher than normal call volume. A jurisdictional hotline is advisable to reduce pressure on hospital phone systems.
- **Decedents:** Depending on the scope of the incident, hospital and community morgue capacity may be overwhelmed. Hospitals should have plans to expand morgue capacity onsite and understand the jurisdictional mass fatality plan, how it is activated, and how

decedents are moved in a large-scale incident. Staff should also understand the needs of law enforcement investigating a bioterror attack.

- **Vaccination:** Depending on the agent, vaccination may be required to limit spread or added to prophylaxis regimens to prevent infection.

Unfortunately, it is likely that despite the best-laid plans, a major bioterrorism incident will overwhelm healthcare resources and require triage decisions. Ensuring maximal utilization of resources through regional coordination (including MOCCs) and maximal engagement of adjacent regions as well as federal resources will help blunt the impact. The earlier the resources are mobilized, the more of a difference they can make. Invoking crisis standards of care strategies is always difficult, but providing guidelines to clinicians about patients who are least likely to survive based on clinical features of the illness can facilitate consistent decision-making. A bioterrorist attack will also likely frighten many staff and patients and drive unnecessary visits to providers. Pressure on the healthcare system will be sustained and require ongoing staffing and supply support for weeks. As the incident moves past the peak, hospitals should continue working with public health to determine if vaccination or other mitigation strategies are needed.

Conclusion

Hospitals are more commonly seeing unfamiliar diseases due to travel and changes in endemic areas (e.g., locally acquired malaria in the United States), and the risk of pandemics and bioterrorism are ongoing. Special pathogens and epidemics require coordinated planning and training to maintain staff safety and effective patient care. Larger incidents can result in major disruptions in services, supply chains, and staffing. A coordinated approach between hospital emergency management and infection prevention staff is needed as biological incidents will require implementation of emergency procedures and, often, activation of Incident Command. Though most hospitals are not well-versed in using the Planning Section of Incident Command due to the short-term nature of most incidents, it is especially critical during prolonged biological incidents to ensure a proactive response and coordination within the facility and with the healthcare coalition and jurisdiction, and to promote adaptation to current and expected conditions. Unlike most responses, Incident Command also must consider potential and evolving impacts on their staff, the Incident Command team, and potentially their entire patient population and adjust strategies accordingly. Fortunately, the U.S. healthcare system has not yet experienced a biological incident in the era of critical care that has grossly exceeded capacity and required systematic triage of patients. However, hospitals must be prepared for plausible biological incidents that can significantly strain operations.

Related Resources

ASPR TRACIE's Crisis Standards of Care Resource Page includes Briefs and Considerations to assist with planning. The Medical Operations Coordination Centers Resource Page has information to help with patient load balancing, which may mitigate the need to implement crisis care.