

SCENARIO 4: Disease Smallpox

Introduction

This scenario takes place in Baltimore, MD, a port city whose population is 650,000. Baltimore's proximity to Washington, DC, brings many visitors to its Inner Harbor, the National Aquarium, historical landmarks like Fort McHenry, and its baseball stadium, Oriole Park at Camden Yards.

A terrorist group has released the smallpox virus (variola major) [[Hotlink to CDC NCID](#)] at a small university. It is widely believed that the smallpox virus only exists in two laboratories on earth, and as a result, would be difficult to acquire. However, experts have speculated that other nations may have acquired supplies of the virus. An attack using the virus would involve relatively sophisticated strategies and would deliberately seek to sow public panic, disrupt and discredit official institutions, and shake public confidence in government.

Smallpox is one of the worst bioterrorism scenarios. Since there has not been a case of smallpox in nearly 25 years and mass vaccination ended many years ago, large parts of the world's population may be susceptible to the virus.

Smallpox spreads from person to person via airborne droplets and usually requires prolonged exposure to the infected person. Once a person is infected with the smallpox virus, it can take between 12 and 14 days for symptoms to show. During this incubation period, called the prodromal period, the affected person is usually not contagious. The first symptoms that appear include high fever, muscle pain, headache, and backache. Then the characteristic pustular rash appears, starting on the face and arms, spreading to the torso and legs. At this point, the infected person becomes highly contagious. Vaccinating those exposed to the virus within 2-4 days following exposure may prevent the disease from occurring or limit its effect. Other than vaccination, treatment is limited, and the virus has to run its course. Smallpox generally has a 30 percent fatality rate, and scars from the pox may disfigure those who survive.

The last U.S. case was in 1949, and immunization ended here for civilians in 1972 (military personnel continued to get the vaccine for a few more years). There are few physicians left who have seen or treated a case of smallpox.

Vaccine production for civilian use stopped in 1982, and but there are stores of vaccine that are useable. There are only 15 million doses currently available, but Federal scientists have conducted tests that indicate that the available vaccine can be diluted without losing effectiveness to create 67 million doses, if necessary. In addition, the Government has contracts with several companies to make enough doses of the smallpox vaccine to inoculate the entire population of the United States. The new vaccine will be ready by the end of 2002. However, the vaccine itself carries side effects that include skin lesions, brain inflammation, and even death, in rare cases. The risk of acquiring smallpox must outweigh the risks of the vaccine itself in order to make vaccination a reasonable option.

Step 1. Verify situation

Baltimore, MD - Monday, April 1. The Vice-President visits Baltimore, MD. His itinerary includes an awards ceremony and a major speech at the local university. A crowd of 1,000 people, including students, gathers in the university auditorium. Hundreds more wait outside, where the Vice-President stops to shake hands and respond to queries from the media.

The FBI has information suggesting a possible threat against the Vice-President from a terrorist group. The group, known to have made inquiries about acquiring biological pathogens, including smallpox, is suspected of having procured aerosolization equipment. The FBI decides its information is too vague and too sensitive to pass on to the DHHS, local law enforcement authorities, or the State health department.

April 8 - FBI informants report rumors that something happened while the Vice-President was in Baltimore.

April 12 - A 20-year-old university student goes to the university hospital emergency room (ER) with fever and severe muscle aches. She is pale, has a temperature of 103° F, and is slightly leukopenic (low white blood cells), but the physical exam and laboratory results are otherwise normal. She is presumed to have a viral infection and is sent home with instructions to drink fluids and take aspirin or ibuprofen for muscle aches. Later that day, a 40-year-old electrician arrives at the ER with severe lower backache, headache, shaking chills, and vomiting. He appears pale and has a temperature of 102° F and a pale erythematous rash on the face. The patient is a native of Puerto Rico, where he visited 10 days earlier. A diagnosis of dengue fever [[[Hotlink to CDC NCID](#)]] is considered, and the patient is discharged with ibuprofen and instructions to drink fluids.

April 13 - Over the course of the day, four young adults in their twenties come to the university hospital ER with influenza-like symptoms and are sent home.

April 14 - The female student returns to the ER after collapsing in class. She now has a red, vesicular rash on the face and arms and appears acutely ill. Her temperature is 102° F; her blood pressure is normal. She is admitted to an isolation room with presumptive diagnosis of adult chickenpox. She has had no contact with anyone infected with chickenpox [[[Hotlink to ipeg of chickenpox/smallpox chart](#)]].

April 15 - The electrician first seen on April 12 returns to the ER by ambulance. He too has a vesicular rash and appears very ill. He is also admitted to an isolation room with presumptive diagnosis of chickenpox.

That evening at 6 p.m., by chance, the infectious disease specialist and the hospital epidemiologist meet on the elevator. The infectious disease specialist has just finished examining the student and the electrician, both of whom have vesicular rash on the face, arms, hands, and feet. The possibility of smallpox is raised. The infectious disease specialist takes a swab specimen from the electrician's skin lesions, sends it to the laboratory, and requests that it be examined by electron microscopy by an experienced technician. The doctor assures the

technician that he will be vaccinated if the specimen shows smallpox. At 7:00 p.m., electron microscopy shows an orthopoxvirus consistent with variola major—the smallpox virus.

Step 2. Conduct notifications

At 7:15 p.m., the hospital epidemiologist declares a contagious disease emergency. The two patients are moved to negative-pressure rooms with HEPA filters. Visitors and hospital staff not already caring for and in contact with the patients are forbidden to enter the floor. Infection-control nurses begin interviewing staff to determine who has had face-to-face contact with the patients during initial ER visits and admission. The hospital epidemiologist calls the chair of the department of medicine and the hospital vice-president for medical affairs.

Within 45 minutes, the chair of the department of medicine and the president of the hospital are meeting with the infectious disease physician, the hospital epidemiologist, the hospital vice-president for public relations, and the hospital's general counsel. The city and State health commissioners join the meeting by phone. The need to vaccinate and isolate all contacts of the patients is recognized and discussed. It is decided to secure the hospital. No one is allowed to leave until all persons are identified so that they can be vaccinated as soon as vaccine can be obtained from the CDC. The possibility of identifying and vaccinating other patient contacts is discussed, but no decisions are made because the hospital's legal authority for doing this is unclear.

Within a half-hour, the State health commissioner calls the FBI. He also contacts the CDC to request that smallpox vaccine be released for hospital staff and patient contacts. Because initial vaccine supplies are limited, the CDC requests that the diagnosis of smallpox first be confirmed at the CDC. The CDC calls the FBI and arranges to fly a Smallpox Response Team to Baltimore for assistance.

By 9:30 p.m., an FBI special agent arrives at the hospital, secures biological samples taken from the patients, and drives them to Andrews Air Force Base, where a military aircraft flies the samples to the CDC's Biosafety Level 4 laboratory in Atlanta. The FBI recommends that city police and the National Guard be called to help maintain order and ensure that no patients, staff, or visitors leave the hospital until all occupants have been identified and their addresses have been recorded. More FBI agents, city police, and the National Guard arrive on the hospital grounds.

Step 3. Assess level of crisis

Hospital visitors are confused and angered by police refusal to allow anyone to leave the hospital. No explanation is given for the containment of staff and visitors. Ambulances are rerouted to other hospitals. Talk that smallpox has broken out rapidly spreads through the building, as do rumors that a terrorist wanted by the FBI is in the building. A fight erupts between people trying to leave the facility and the police. More police and National Guard soldiers arrive and surround the building.

Local television networks report the scene outside the hospital on the 11:00 p.m. news. The hospital public relations representative explains that the lock-in is temporary and intended only to gather names and addresses so that people can be contacted and treated if a suspected, but unnamed, contagious disease is confirmed. CNN arrives and demands access to the hospital and affected patients. Speculation about what the contagious disease might be include Hong Kong flu, meningitis, Ebola virus, smallpox, and measles.

The mayor and State attorney general's office are contacted by the health commissioner. There is a phone discussion with the hospital's general counsel and epidemiologist about the right to impose quarantine [[**Hotlink to Model State Emergency Act**]]. Visitors, nonessential personnel, and new patients are blocked from entering the hospital, but visitors already in the building are allowed to leave after their names and addresses are recorded.

11:30 p.m. - The specimen arrives at the CDC. At midnight, the diagnosis of smallpox is confirmed. A phone conference with hospital staff, the city police chief, the State health commissioner, the State attorney general, the Governor, the CDC, the FBI, an assistant secretary of the HHS, and staff from the National Security Council and the White House (32 people in all) focuses on whether and how to release the information to the media. The mayor and the Governor will appear on television in the morning with the health commissioner. The FBI director will also make a statement. The President will address the country at noon.

The CDC makes arrangements to release smallpox vaccine early the next morning for use by patient contacts and the health care teams caring for hospitalized victims.

April 16 - Morning conference calls between the CDC, FBI, HHS, National Security Council, and State health authorities are set up. Federal officials now assume that a bioterrorist attack has occurred in Baltimore. There is concern that other attacks might also have taken place but not yet come to light or that further attacks may be imminent.

Step 4. Organize and give assignments

A representative from the counterterrorism office of the National Security Council asks if it is necessary or desirable to attempt a complete quarantine of Baltimore, including closure of the city airport and a ban on rail traffic leaving from or stopping in the city. The group agrees that such a step is neither feasible nor warranted. A heated debate follows about the advisability of vaccinating all hospital staff and visitors at all facilities where a single case of smallpox is clinically suspected. The State health commissioner presses for enough vaccine for the entire city of Baltimore.

The CDC is reluctant to begin mass vaccination until the dimensions of the outbreak are better understood. It is decided to vaccinate all hospital staff and any visitors to the floor where the patients were located. All direct contacts of the patients will also be vaccinated. By the end of the long phone conference, the decision is made to vaccinate all health care personnel, first responders, police, and firefighters in any city with confirmed cases of smallpox.

The CDC Smallpox Response Team, including Epidemic Intelligence Service officers, infectious disease specialists, lab technicians, an information technology specialist, and a communication

specialist, arrives in Baltimore to assist the State epidemiologist, who is establishing a statewide surveillance and case investigation system. Efforts begin to develop a registry of all face-to-face contacts of smallpox patients and to monitor, daily, all contacts for fever. Anyone who has fever greater than 101° F is to be isolated, at home, if possible, and be followed for rash.

The State health department activates a prearranged phone tree to query all hospitals and walk-in clinics in the State about similar cases and counsels immediate isolation of all suspected patients.

An additional eight admissions for fever and vesicular rash are discovered. All patients are extremely ill; two are delirious. The university hospital ER records are searched, and staff attempts to contact all patients who had fever during the previous week. Three more probable smallpox cases are discovered. Telephone follow-up reveals that one has been admitted to another hospital out of state.

The CDC and State health officials discuss possible strategies for managing the epidemic until vaccine can be administered to all patient contacts. Home isolation of nonvaccinated patient contacts is considered, but the legal authorities, practical logistics, and ethical implications of such a strategy remain unclear and unresolved.

After discussion among State health authorities and university hospital staff, it is decided that the university will serve as the city's smallpox hospital and will accept transfers of smallpox patients now hospitalized at other facilities in the State. Other hospitals will not admit patients with suspected smallpox, but will refer them to the university hospital or to the State armory. Physicians will be urged to avoid seeking admission for most smallpox patients and to care for patients in their homes.

Arrangements are made by the State health commissioner to activate a State disaster plan, which establishes the armory as an emergency hospital for the quarantine of smallpox patients, in case the number of smallpox patients exceeds hospital isolation capabilities.

Step 5. Prepare information and obtain approvals

During the morning interagency phone conference, Department of Justice representatives raise questions about potential legal liabilities associated with adverse vaccine effects. The questions remain unresolved, but vaccination will proceed.

On the evening of April 16, the President goes on television to inform the Nation of the bioterrorist attack by unknown terrorists, vows that the assailants will be identified and brought to justice, and urges calm and cooperation with health authorities.

The initial epidemiologic evidence and FBI information suggest that the smallpox release likely occurred during the Vice-President's speech at the university in Baltimore. Efforts are begun to identify and vaccinate everyone who attended the speech. Additional health department personnel are detailed to help in the epidemiologic investigation. Media reports say that the government does not know how many people are sick or how widespread the outbreak might be.

Step 6. Release information to the public

By evening, 35 more cases are identified in eight ERs and clinics around the city; 10 cases are reported in an adjoining State. The CDC alerts all State health departments to be on alert for possible smallpox; the CDC also urges prompt and strict isolation measures and instructs States to send specimens from suspected patients to its headquarters in Atlanta for definitive laboratory diagnosis.

April 17 - In Baltimore, the city and State health departments vaccinate 10,000 residents with assistance from volunteer physicians and nurses. State health officials continue to press for a statewide vaccination effort. Unions representing nurses and other health care workers call for vaccination of all employees whose jobs involve direct patient contact.

April 18 - An additional 20,000 residents of Baltimore are vaccinated.

April 19 - The CDC and the USAMRIID determine that the infecting strain of smallpox was not bioengineered. The genomic sequence is entirely typical of known smallpox strains.

The student with the first diagnosed case dies. Ten more smallpox cases have been identified, bringing the number of confirmed cases to 50. The patients are located in four States, all in the mid-Atlantic area. Suspected cases are identified in five other States.

April 20 - Governors of affected and unaffected States press, both behind the scenes and publicly, for emergency vaccine stocks to be distributed to States so that immediate action can be taken should an outbreak occur.

At the close of day 4 of the vaccination campaign, 80,000 persons have been vaccinated.

April 22–27 - No new cases of smallpox with onset after April 19 have been confirmed, although many suspected cases with fever and rash due to other causes are being seen. In the States reporting confirmed smallpox cases, thousands of people are seeking medical care because of worrisome symptoms. The CDC and State health authorities decide to issue a recommendation that patients with fever who cannot be definitively diagnosed be strictly quarantined and observed until the fever subsides. The CDC and State health departments are flooded with calls from health care providers seeking guidance on isolation procedures.

Some hospitals and health maintenance organizations (HMOs) complain to HHS that they cannot afford to isolate the many patients with fever and rash at their facilities and demand that the Government pay quarantine costs. State health departments are similarly worried about the costs of quarantine.

Local media report an outbreak of sick children with rash in an area elementary school. It is unclear whether the illness is chickenpox or smallpox. Television stations show film of parents arriving at school in midday to remove children from classrooms. A college basketball star is rushed to hospital by ambulance with an unknown illness. Local television reports that the athlete has high fever but no rash. Both stories are covered on the national evening news.

April 28 - Smallpox is diagnosed in two young children in New York City. The FBI and the National Security Council worry that these cases might signal another attack since the children have had no discernible contact with a smallpox patient or contacts. The possibility that there has been a new attack is weighed against the possibility that the children were infected by a contact of one of the first wave of patients who was missed in the epidemiologic investigation.

Members of the New York State congressional delegation demand that the Federal Government implement a massive citywide vaccination program. The CDC notes that a New York City-wide vaccination program could take weeks.

The media report that the President, Vice-President, cabinet representatives, and prominent members of Congress have been vaccinated, and the military has already begun to vaccinate the troops in affected States and Washington, DC.