Smallpox as a Bioweapon
Fauzia Manzoor, MD

The worldwide eradication of smallpox is without question one of the greatest achievements in the fields of medicine and public health. This feat would have most certainly been impossible without global cooperation, the use of an effective vaccine, and a careful epidemiologic surveillance program. The world has not seen a case of smallpox since 1977, and the last case in the United States occurred in 1949. Smallpox was produced as a weapon by several nations well past the 1972 Bioweapons convention that prohibited such actions. The potential for intentional release of a now eradicated, deadly communicable disease in a basically non-immune population is truly frightening. This horrific possibility is difficult for some to imagine.

Recent reports of smallpox threats have prompted a serious assessment of clinical strategies in the event Smallpox being used as a Bioweapon. Few natural or intentional threats generate more concern among emergency management planners, physicians, nurses, and toxicologists in this country than the use of biological agents as an act of war against citizens of the United States.

With these concerns in mind, this article will review recent clinical and pharmacological developments in this field. Special emphasis is devoted to recent developments concerning smallpox and roles and responsibilities of communities and first responders in preparedness efforts. The most recent concern is adverse reactions to the smallpox vaccine in the small group of population who received this vaccine for the first time. Whether it should be used for general public as a prophylaxis against smallpox is debatable.

A review of information on Smallpox disease

History
Smallpox is an orthopox virus that affects primates, particularly man. Smallpox was described more than 2000 years ago. It apparently originated
Smallpox was used as a biologic weapon in the United States during the French and Indian War. In modern times, however, smallpox was considered an unlikely agent of biowarfare because there was a high level of population immunity to the virus, there is an effective vaccine, and the use of the vaccine can rapidly control outbreaks. Theoretically, the virus now exists in only two laboratories in the world in the United States and in Russia. Were smallpox virus released as an act of terrorism, the results could be catastrophic. A large proportion of the adult population and all of the pediatric population have no immunity. The CDC says it has access to enough vaccine to effectively respond to an outbreak in the United States. A Dec. 13, 2002, document says the United States currently has sufficient quantities of the vaccine to vaccinate every person in the country in an emergency.

**Worldwide Eradication:**
- Declared eradicated in 1980.

- The last “wild” case of smallpox was detected in Somalia in October 1977, and the last reported human case occurred in a laboratory in 1978. As a result of recent national and international concerns, current recommendations on vaccination are in flux. Routine vaccinations stopped in the US in 1972. Certain military and civilian personnel deployed to high-threat areas are being vaccinated. Health care workers are being asked to volunteer to receive the vaccine. Vaccination is not currently recommended for the general public.

**Types:**
There are two types of smallpox; variola major, with a mortality of 20-30% in unvaccinated individuals; and variola minor, with a mortality of about 1%. Infection with variola minor protects against subsequent infection with variola major. The intranasal or intradermal introduction of dried smallpox variola minor scabs was used to prevent smallpox nearly 1000 years ago. Subsequently, Jenner substituted intradermal cowpox, a milder Orthopox

in India or western Asia and then spread to China. About 700 AD, smallpox spread to Japan, Europe, and North Africa. European colonization in the Americas and Africa was associated with extensive epidemics of smallpox among native populations in these continents in the 1500s and 1600s.
virus infection, to prevent smallpox in 1798. Vaccinia, a related Orthopox of uncertain origin, has replaced cowpox for vaccination.

**Transmission:**

- Person to person, airborne, or direct contact
- Most common after prolonged face to face contact
- Spread by contaminated bedding, clothing
- Contact with infected bodily fluids
- Virus is fragile; 90% aerosolized virus dies within 24 hours.
- Infected person is contagious until last smallpox scab falls off

The virus can be transmitted by face-to-face contact, secretions, and aerosols. It is a durable virus and can exist for long periods outside the host. It is remotely possible that it still is living outside of the repository labs. Fortunately, aerosol vaccinia (and probably variola virus) is deactivated within 24 hours by ultraviolet light and heat. By the time casualties present to the emergency department with clinical symptoms, they would not need to be decontaminated.

**Incubation period:**

- Smallpox has an incubation period of about 10-14 days, range 7-17 days. During this time, infected person feels fine and is not contagious
- The illness has a prodrome of 2-3 days with malaise, fever, headache, and backache. Over the next 7-10 days, the characteristic lesions erupt, a rash that spreads and progresses to raised bumps and pus-filled blisters that crust, scab, and fall off after about 3 weeks, leaving a pitted scar.
- The disease is fatal in about 35% of cases.

**Presentation:**

The majority of smallpox cases present with a typical rash that is most dense on the face and extremities. The lesions appear during a one- to two-day period and evolve at the same rate. It should be differentiated from chickenpox.

**Chickenpox:**

In chickenpox [varicella], new lesions appear in crops and lesions of different ages are present in adjacent areas of the skin. Chickenpox lesions are more numerous in the trunk than in the extremities.)
**Hemorrhagic smallpox:**
Some patients will develop disseminated intravascular coagulopathy (hemorrhagic smallpox). Hemorrhagic smallpox is uniformly fatal. The illness has a somewhat shortened incubation period and is accompanied by high fever and head, back, and abdominal pain. Shortly after the pain starts, the patient develops a dusky erythema, followed by petechiae and flank hemorrhages into the skin and mucous membranes. Death occurs by the fifth or sixth day after the rash. Pregnant women are particularly susceptible to this variant of smallpox. Hemorrhagic cases of smallpox were frequently misdiagnosed as meningococcemia.

**Malignant smallpox:**
Another variant of smallpox is malignant smallpox, a “flat-type” smallpox associated with severe toxemia and high mortality. In the malignant form, the abrupt onset and shortened incubation period are similar to the hemorrhagic variant. In malignant smallpox, the skin lesions develop slowly and do not progress to the pustular stage, hence the description as “flat.” The skin develops the appearance of a fine-grained, reddish-colored crepe rubber. Hemorrhage is sometimes noted within the skin. These flat lesions disappear without scabs in survivors. Some patients will have desquamation of large areas of affected skin. Diagnosis of this variant of smallpox may be quite difficult until viral studies are available. These patients were frequently misdiagnosed because the appearance was atypical.

**Monkeypox:**
Monkeypox is a milder form that has been reported in the Democratic Republic of the Congo (formerly Zaire). The clinical picture is indistinguishable from smallpox. The case fatality rate of verified monkeypox in patients who were not vaccinated against smallpox was 11% (15% for children younger than age 5). As with smallpox, the disease is significantly milder in vaccinated persons. A major differential point of monkeypox is the presence of large cervical and inguinal lymph nodes. These are uncommon in both smallpox and chickenpox.

**Sequelae of Smallpox:**
The most common sequelae of smallpox are scarring, particularly facial. Rarely, smallpox may cause blindness due to ocular involvement (keratitis). Other complications include smallpox pneumonia and arthritis (may have permanent joint deformities).
**Seasonal Occurrence:**
The seasonal occurrence of smallpox is similar to chickenpox and measles. Its incidence is highest during the winter and early spring. Large outbreaks in natural smallpox were rare during the summer.

**Infective Period:**
Transmission of smallpox is slowed because the disease usually is not infective until the patient has been confined to bed with high fever and rash appears. Unfortunately, this means that in-hospital infectivity is quite high. (In Germany, a smallpox patient with a cough, isolated in a single room, infected persons on three floors of a hospital. This infectivity would be increased when diagnosis is delayed, as in malignant or hemorrhagic smallpox.

In natural smallpox, the disease is infective from the appearance of the rash through the first 7-10 days of the rash. An aerosol release of variola virus would disseminate widely, since the virus is stable in aerosol and the infectious dose is quite small.

During epidemics in the 1960s and 1970s in Europe, as many as 10-20 second-generation cases were infected from a single case. The illness associated with variola minor generally is less severe and fewer systemic symptoms are seen. The rash often is sparse. This presentation also may be seen in those who have residual immunity from prior vaccination. In the partially immune patient, the rash is atypical and scant. The evolution of the lesions may be more rapid.

Vaccinia produces a localized pustular lesion at the site of inoculation, with localized lymph node involvement. When administered to immunocompromised patients, vaccinia may become progressive.

Generalized vaccinia occurs 6-9 days after inoculation. The patient also accidentally may spread vaccinia to other body sites (e.g., ocular vaccinia).

Postinfectious encephalitis following inoculation with vaccinia is possible. The most important clue about disseminated vaccina is a vaccination or exposure to a recently vaccinated individual.

**Diagnosis:**
Like many viral diseases, the diagnosis is best made by clinical impression. Smallpox has an incubation period of 10-14 days followed by the abrupt onset of fever, headache, malaise, and backache. Three to four days after the onset of symptoms, a characteristic rash appears on the oropharynx, face, forearms, and hand. The rash evolves from macules to papules to vesicles
and finally to pustules. After 8-9 days, the pustules will rupture and crust over. The rash has profuse involvement of the face, forearms, and lower legs. The trunk and abdomen usually are spared.

**Routine labs** are not helpful, although leukopenia is frequent. Clotting factors may be depressed and thrombocytopenia may be found. Diagnosis may be made with immunofluorescence, electron microscopy, or culture. Orthopox viruses are large, brick-shaped viruses with a single double-stranded DNA molecule. A recently developed polymerase chain reaction (PCR)-based assay of the hemagglutinin gene allows classification of all of the species of the orthopoxvirus family.

**Treatment**
- First case and all contacts should be quarantined for 17 days or until resolution
- Vaccination recommended within 4 days of exposure
- No proven treatment.
  Therapy is entirely supportive (IV, fever control, antibiotics to prevent secondary bacterial infections. Three compounds (cidofovir, its cyclic derivative, and ribavirin) have significant antiviral activity against variola. These medications have not been used in treatment and may or may not be effective.

**Outcome**
- Majority of patients recover
- Death may occur in up to 30% of cases
- Survivors may have permanent scars over large areas of their body, especially on the face.

**Vaccination:**
Vaccination administered within four days of first exposure has been shown to offer some protection against acquiring the infection and significant protection against a fatal outcome. An emergency vaccination program should include all health workers at clinics or hospitals that may receive such patients and all disaster workers such as EMS, hospital staff, police, public health staff, and mortuary staff. These personnel should be vaccinated as soon as the first case is diagnosed, irrespective of prior vaccination status. Vaccination should be considered for any other persons who would be
responsible for patient care during a suspected outbreak of smallpox and for the investigation and control of suspected outbreaks of smallpox.

**Prophylaxis:**
Prophylaxis against smallpox has been available since the time of Jenner and is well documented. Since smallpox is presumed to have been eradicated worldwide, there is no recommendation or requirement for routine vaccination of the general public, however military personnel deployed to high-risk areas are being vaccinated, and there currently is a voluntary vaccination program for potentially at-risk health care workers.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Vaccine</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Pox</td>
<td>Given prior to exposure. Inoculation provides almost 100% protection against the disease. It is most effective after 4 days after exposure. People who were previously vaccinated will have protection and have faster onset of protection when revaccinated. Some</td>
<td>The CDC says that United States has enough vaccine for every person in the country in the event of emergency. Contraindicated for immunosuppressed individuals. Not recommended since 1980.</td>
</tr>
</tbody>
</table>
antiviral may also may be effective.

Those who have been vaccinated at some time in the past will usually have an accelerated immune response. Those who have been previously vaccinated may be somewhat safer in situations with close patient contact.

**Isolation:**
Isolation of all contacts of exposed patients would be quite difficult. If the weaponized smallpox is like the natural variety, patients are not infective until the onset of the rash. A practical strategy argues that all contacts should have their temperatures taken daily, preferably in the evening. A fever of 101°F (38°C) or higher should be cause for isolation of the contact until clinical or laboratory diagnosis of the disease or other cause of the fever. All close contacts should be promptly vaccinated. Experience during the smallpox global eradication program showed that patients who had no rash did not transmit infection, so “isolation on fever” is a logical step. The malignant (flat) form of the rash and the hemorrhagic form of the rash are just as infective as the classic rash.

**Decontamination:**
The person-to-person infectivity, high mortality, and stability of the virus make variola a potential BW threat. Other animal poxviruses could be easily genetically engineered to be virulent in humans. A human cell culture-derived vaccinia is being developed at Fort Detrick. Smallpox vaccine is not without complications, since vaccinia can be lethal to immunosuppressed patients. Indeed, among 5.5 million vaccinations done during the 1961-1962 outbreaks of smallpox in the United Kingdom, vaccination caused at least 18 deaths. With transplantation, more aggressive cancer chemotherapy, use of high-dose steroids, and HIV infections, the number of immunosuppressed individuals has grown markedly since 1952. Each of these patients is at mortal risk from the prophylaxis of smallpox. Objects in contact with a contaminated patient need to be cleansed with live steam or sodium hypochlorite solution (or other standard disinfectants). The virus may remain viable for extended periods of time in clothing or linens. Bed linens and dressing material should be autoclaved before laundry or disposal.

**Roles and responsibilities of communities and first responders in preparedness efforts**
Although a vast array of first responders, including elements of the military, police, and fire departments, emergency medicine services, and hazardous materials units have been preparing to respond to such emergencies, relatively few practitioners have been involved in comprehensive efforts to defend against possible acts of bioterrorism. Especially in a covert attack, however, primary care practitioners, emergency medicine specialists, and departments of pharmacy—which would be responsible for maintaining adequate inventories of antidotes, vaccines, and antimicrobials required for such a contingency—would play a front-line role in the detection, evaluation, and response to this threat. Formal educational curricula informing clinicians about the likely agents of bioterrorism are essential to ensure that cases are identified, reported, treated, and monitored as rapidly and efficiently as possible.

As practitioners are well aware, the current Smallpox threat remains a fluid, uncertain situation. In light of rapid changes in both our understanding and approach to bioterrorist activities, and as new patterns of infection are recognized, the treatment options, epidemiology, and approaches to management and prophylaxis of Smallpox are being closely monitored by medical, military, and governmental agencies.

This has important implications for clinical practice. Because diagnostic and management strategies are under constant review and evaluation, clinicians are advised to consult and monitor the most recent recommendations, reports, and advisories issued by such expert bodies as the Centers for Disease Control and Prevention and the Food and Drug Administration, as well as such publications as the Morbidity and Mortality Weekly Report (MMWR) and Biological Warfare Defense General Information Sheet. Regional poison control centers also are excellent sources of current information regarding bioterrorist threats, and also may be accessed for up-to-date information.

**Initial Assessment and Treatment**

In the event of a covert biological agent like Smallpox attack, ED practitioner awareness would most likely occur when increased numbers of patients present with clinical symptoms of a suspicious nature. Because early presentation of Smallpox has nonspecific clinical features, early recognition and timely intervention may be difficult, and therefore heightened awareness is essential.
**Suspicion.** Before the medical personnel approach a potential biological casualty, they need to ensure that they are appropriately protected. The rescuer will do little good if he or she becomes infected and is a subsequent casualty. HEPA-filter masks will provide adequate protection against inhalational biological warfare (BW) threats. Gowns and gloves complete the ensemble.

The initial assessment of the patient with a potential Smallpox infection often is hasty and may cloud the issue. In the early phases, it might mimic common endemic problems. If the clinician is not asking how this patient may be different from other patients with similar illnesses, the patient may not be identified and the window for effective therapy may be missed.

**Stabilization and Decontamination.** Airway, breathing, and circulation problems should be addressed before any specific management is contemplated. Physical examination should concentrate on pulmonary and cardiac systems. Unusual dermatologic and vascular findings should be documented and photographed.

The incubation period of Smallpox makes it unlikely that decontamination will be warranted. If the exposure is quite recent and known, then decontamination with soap and water or 0.1% bleach may be appropriate.

**Diagnosis.** Questions about food and water sources, vector exposure, immunization history, travel history, occupation, and illnesses in other family members may offer clues to the clinician and should be recorded in meticulous detail.

The amount of expertise available to the emergency clinician will vary with the medical practice. At tertiary care centers; a full range of laboratory capabilities should help with a prompt diagnosis. At primary care centers, specimens should be obtained and forwarded through public health channels or reference laboratories.

The clinical laboratory should be notified that these specimens might represent BW agents so that utmost precautions can be taken and the use of optimum culture media can be planned.

While awaiting the results of the laboratory diagnosis, the clinician must formulate a clinical diagnosis.

**Treatment:**

Patients with smallpox or other viral illness will not suffer significant harm from empiric antibiotics.

Final treatment, including protection for the involved health-care workers, must be predicated on an accurate diagnosis.
Notification. Hospital administration, public health officials, and law enforcement must be notified about the possibility of a biowarfare incident. It is far better to call and activate systems early so that adequate medical supplies are available.

Public Health management and details on current planning efforts

In response to this potential public health catastrophe, U.S. public health, as well as Department of Defense, authorities have directed the reintroduction of a smallpox vaccination program. The general civilian population has not received smallpox vaccinations since 1972; however, the Department of Defense continued to inoculate non-immunized recruits until 1990. So, the reintroduction of a highly successful, time-proven immunization program should be a simple, uncomplicated decision.

The smallpox vaccination is a live-virus immunization containing vaccinia (not variola) virus. Vaccinated individuals may shed live virus for 2-3 weeks, and this shedding inadvertently can be passed to close contacts. Inadvertent exposure to this live virus can be very serious for persons with compromised immune systems or chronic diseases, and in pregnant women. This was much less of an issue during the earlier era of vaccination. We did not have advanced medical treatments that extended the lives of patients with cancer, human immunodeficiency virus infection, or autoimmune disorders, nor did we accomplish significant, successful organ or bone marrow transplantation. Also, women were generally immunized as children -- well before childbearing age.

Vaccination:
Vaccination administered within four days of first exposure has been shown to offer some protection against acquiring the infection and significant protection against a fatal outcome. An emergency vaccination program should include all health workers at clinics or hospitals that may receive such patients and all disaster workers such as EMS, hospital staff, police, public health staff, and mortuary staff. These personnel should be vaccinated as soon as the first case is diagnosed, irrespective of prior vaccination status. Vaccination should be considered for any other persons who would be responsible for patient care during a suspected outbreak of smallpox and for the investigation and control of suspected outbreaks of smallpox.
**Smallpox Vaccine**
- Only way to prevent smallpox
- Most U.S. children vaccinated until 1972
- Vaccine made from vaccinia virus - live virus
- Successfully used to eradicate smallpox
- Delivered using a bifurcated needle, prick skin 15 times
- Successful vaccination: Red itchy bump in 3-4 days
- 95% effective in providing protection

**Precautions**
- Live virus
- Can spread to other parts of the body or to other people from the vaccination site
- Spread is prevented through proper vaccination site care and good hand washing after contact.

**Immunity**
- Vaccination after exposure: within 3 days, protective against disease; within 4 days, protective against fatal outcome
- First dose – Protection for 3-5 years
- Those revaccinated may have longer immunity

**Safety**
- Offers the best protection if exposed to the smallpox virus
- Normal reaction to the vaccine: mild
  - Sore arm
  - Fever
  - Body aches
- 1/3 may miss work, school, recreational activity, or have trouble sleeping

**Risks**
- 1000/1,000,000 vaccinated for the first time experienced serious, non-life threatening reactions
  - Vigorous take
  - Vaccinia virus spread
- 14-52/1,000,000 may have a potential life threatening reaction
- Eczema vaccinatum: Caused by implanting the vaccinia virus into diseased skin
  - Progressive vaccinia: primary vaccination site fails to heal and spreads
- 1-2/1,000,000 may die
- Careful screening for contraindications is essential
**Contraindications to Smallpox vaccine**

Who should not get vaccinated during pre-event vaccination

- Persons with eczema or atopic dermatitis or other skin conditions.
- Immunosuppressed persons with weakened immune systems or autoimmune disease.
- Pregnant women
- Breastfeeding women
- Inflammatory eye disorders
- Vaccine component allergy
- Those under 18 years
- Anyone with a household contact with any of the above conditions (except those under 18)

**Adverse Events Associated with Vaccination**

- Accidental Implantation by autoinoculation or contact
- Bacterial infections
- Eczema Vaccinatum: Caused by implanting the vaccinia virus into diseased skin
- Erythema Multiforme: hypersensitive and/or toxic rash
- Generalized vaccinia: caused by viremia
- Progressive Vaccinia: primary vaccination site fails to heal and spreads
- Vaccinia Keratitis: vaccinia virus is implanted in the eye

**Public Health Preparedness Efforts in Cuyahoga County**

Some important features of these efforts are:

- Received funding for improvement of local public health infrastructure for multi-jurisdictional response to public health events
- Formed the Cuyahoga County Public Health Collaborative (CCPHC)
- Common disease reporting and response
- Sharing of disease data – ODRS Ohio Disease Reporting System - (electronic reporting mechanism for Ohio Department of Health)
- Expanding syndromic/influenza surveillance activities
- Public health awareness and response training
- Regional coordination with other public health entities (Lorain, Lake, Geauga, and Ashtabula counties)
- Specifics may vary by Region (7 regions in the state)
Smallpox Pre-event vs. Post-event Planning

The idea behind this pre-event vaccination program within the civilian community is to produce a cadre of medical and emergency personnel who would be able to investigate index cases of smallpox and care for smallpox victims while not becoming casualties themselves.

- **Pre-event:** Planning for vaccination when no cases of smallpox have been identified
  - Conservative, tiered approach: limited to specific groups of people
  - Ample time to vaccinate
- **Post-event:** Planning for vaccination in response to an outbreak of smallpox.
  - All inclusive approach: mass vaccination
  - Limited time to vaccinate

Pre-Event Smallpox Vaccination Strategies

- **Pre-Event:** Planning for vaccination program; no cases of Smallpox have been identified.
- **Phase 1:** One cadre of “first responders”; 15,000 in Ohio, 500,000 in USA
- **Phase 2:** Expands to all “first responders”; 10 million in USA; 500,000 in Ohio
- **Phase 3:** Expands to public

Public Health Preparedness Efforts in Cuyahoga County: Phase 1

- **Pre Event Smallpox Plan**
  - Regional public health pre-event plan submitted to Ohio Department of Health (ODH) on 5th December 2002.
  - Statewide pre-event plan submitted to Center for Disease Control (CDC) on 9th December 2002.
Based on current ACIP (Advisory Committee on Immunization Practices) Recommendations

Public Health Preparedness Efforts in Cuyahoga County: Phase 1

- Pre-Event Smallpox Plan – Highlights
  - Regional Coordination
  - Timeline for Program Implementation
  - Incident Command Structure with Job Descriptions
  - ID Public Health Smallpox Response Teams members
  - ID Healthcare Smallpox Response Team members
  - Hospital and Public Health Responsibilities
  - Vaccination clinic location
  - Training and education plan
  - Scheduling
  - Vaccine Logistics and security
  - Clinic operations and management
  - Vaccine safety monitoring, reporting, treatment, and patient referral
  - Data management
  - Communications plan

Pre-Event Smallpox Vaccination Strategies – Phase 1

- Phase 1 Timeline
  - Phase 1A and 1B
  - Phase 1A: Vaccination of Regional Public Health Team
    - Start: February 20, 2003
      - Site evaluation /dressing change upon request at LHD by Medical Director or designee
      - Evaluation of Take Day 7-10 post vaccination by Medical Director
  - Phase 1B: Vaccination of HC Teams (400)
- Start: Mid-March
- Completion: Mid-April
  - Clinic location: Fairgrounds
  - Clinic hours: 10:00 – 3:00
  - Clinic staff: Regional public health staff – ICS used
  - 2 clinics, 8 days apart
  - Daily site evaluation/dressing change at respective institutions
  - Evaluation of Take Day 7-10 post vaccination at respective institutions

- Public Health Responsibilities
  - Conduct “Public Health volunteer” pre-screening and education
  - Vaccine receipts/storage/inventory/safety
  - Administration of Vaccine to HD/HC Response Team
  - Clinic Design/Set up/Flow
  - Coordinate scheduling of healthcare teams in collaboration with regional hospital coordinator
  - Data management – Vaccine/Vaccine take
  - Communication with ODH/CDC
  - Education/Hot-line

Clinic Layout

Pre-Event Smallpox Vaccination Strategies: Phase 1
- Participating Hospital responsibilities
  - Assess makeup of healthcare smallpox teams
  - Identify Hospital smallpox healthcare team leader
  - Conduct “volunteer” pre-screening and education
  - Maintain list of “qualified” volunteers to be sent to LHD
  - Develop individual hospital plan regarding:
    - Site management
- Evaluation of Vaccine Take
- Adverse Events
- Communication with LHD

Pre-Event Smallpox Vaccination Strategies: Phase 2

- Expands to all “first responders”; 10 million in USA; 500,000 in Ohio
- Police, fire, EMS, health care personnel, public health personnel
- No timeline or further guidance yet available

Pre-Event Smallpox Vaccination Strategies: Phase 3

- Vaccination offered to the public: 2004?
- Implement our Mass prophylaxis plan
- No timeline or further guidance yet available

Public Health Preparedness Efforts in Cuyahoga County

CDC has released an updated version of the post-event Smallpox Response Plan and Guidelines. This is the second revision to these guidelines since they were released in November 2001. Version 3 of the guidelines contains an important addition---the "Smallpox Vaccination Clinic Guide." This guide provides the operational and logistical considerations associated with implementing a large-scale, voluntary vaccination program as part of a multifaceted response to a confirmed smallpox outbreak.

Following a confirmed smallpox outbreak within the United States, rapid, voluntary vaccination of a large segment of the population might be required to

1) Supplement priority surveillance and containment control strategies in areas with smallpox cases.
2) Reduce the at-risk population for additional intentional releases of smallpox virus if the probability of such occurrences is considered significant
3) Address heightened public concerns about access to voluntary vaccination.
The most important component of smallpox containment is the rapid identification, isolation, and vaccination of close contacts of infected patients and contacts of their contacts (i.e., ring vaccination). This strategy involves identification of infected persons through intensive surveillance, isolation of infected persons, vaccination of household contacts and other close contacts of infected persons (i.e., primary contacts), and vaccination of household and other potential contacts of the primary contacts (i.e., secondary contacts).

The clinic guide will assist planning for larger-scale, post-event vaccination when exposure circumstances indicate the need to supplement the ring vaccination approach with broader protective measures. The clinic guide describes the activities and staffing needs associated with large-scale smallpox vaccination clinics, including suggested protocols for vaccine safety monitoring and treatment. The clinic guide provides an example of a model smallpox clinic and provides samples of pertinent clinic consent forms and patient information sheets that would be used at a clinic. The clinic guide and the *Smallpox Response Plan and Guidelines, Version 3* are available at [http://www.cdc.gov/smallpox](http://www.cdc.gov/smallpox).

**Post Event Smallpox Plan - Highlights**
- Designated clinics for mass vaccination (70)
- Isolation and treatment sites
- Response team members
- Necessary documentation to be used
- Incident Command Structure and Job Descriptions
- Communication Plan
- Security Plan
- Cuyahoga County plan submitted to ODH November 14.
- Statewide plan submitted to CDC on December 1.
- Would become effective if a case of smallpox was identified.
- Mass vaccination (1.4 million people) within 4 days after exposure.

**Public Health Preparedness Efforts in Cuyahoga County**

- Comprehensive approach: based on a worst case scenario
- Plan can be scaled back depending on need
- Many logistics and staffing issues exist

- Identified potential sites across the county
  - Based on population centers
- Primary (70) and secondary sites (50) have been indicated emergency coordinators and public health
- Community leaders will be asked to secure the sites for use during a public health emergency
- Schools are the preferred sites
- Planning for 24/7 operation

Clinic Logistics
- Clinic Facility Survey and Memorandum of Understanding (MOU)
  - 24/7 contact information
  - Available equipment
  - Food prep areas
  - Communication mechanisms
  - Map of school/facility including:
    - General layout
    - Parking
    - Exits and entrances
    - Loading dock
    - Handicap accessible areas
    - Helicopter landing area

Clinic Logistics
- Clinic Flow
  - Designed a model based on other flow models used across the country (D.C., New York)
  - Clinic flow is designed to avoid bottlenecks
  - Planning to provide 5000 people/day or approx. 225–325/hr vaccinated or prophylaxes at each facility
  - Must be done quickly and efficiently

Clinic Flow
- Greet/Triage area (near entrance)
- Forms distribution area
- Briefing
- Medical Evaluation/Screening
- Vaccination/dispensign of medication
- Exit
- Other areas
  - Education/Resource
- Special Needs/Mental Health
- EMS/Sick Room

Other Post-event Planning Issues

- Community Awareness
  - Publicizing the clinic information: Media kit
  - How/when will residents be asked to arrive
    - Stagger for treating:
      - 325/hour, 16 hour operation
      - 225/hour, 24 hour operation
  - Providing general information/crisis communication

- Families of clinic personnel
  - Proposed that families of clinic personnel will receive treatment prior to community wide implementation
  - Conducted at 9 sites throughout the county

\Regional Map

Clinic Staffing Issues

- Medical staff
- Non-medical staff (community volunteers)
- Approx. 70 sites throughout the county
- Approx. 103 staff per shift, 206 per day
  - 34 Medical volunteers
  - 69 Community volunteers

- Estimated resources needed county-wide:
  - 14,420

Clinic Staffing Issues:
- Medical Staff
  - 34/shift or 68/day
  - Physicians
● Nurses
● Pharmacists
● Dentists
● Paraprofessionals

Clinic Staffing Issues:
Non-medical (community) Staff
● 69/shift or 138/day
● Local emergency coordinators
● Community leaders
● City management
● Local police, fire, EMS, auxiliary police
● School employees: maintenance, custodians, health educators, teachers, cafeteria, security, crossing guards
● Red Cross
● Faith community leaders

Managing the operation
● Use of the Incident Command System
● Emergency Operations Center (EOC)
  – Unified Command: Local public health officials
    ● Public Information Officer
    ● Legal Officer
    ● Liaison Officer
    ● Medical Advisory Committee
    ● Safety and Security Officer
    ● Logistics, Planning, Finance, and Operations

Medical and Public Health Roles and Responsibilities at the Clinic

● Liaison Officer
● Medical Supply inventory and storage
● Planning

● Medical Staff leader
● Medical evaluation
● Vaccination or Dispensing or meds

Site Community Roles and Responsibilities at the Clinic
● Staff support
● Transportation
● Traffic control and Security
• Facility support
• Data management
• Office supply inventory and storage
• Finance
• Volunteer staff leadership
• Communications
• Briefing, forms distribution, and completion
• Flow coordination
• Education and resource area
• Special needs
• EMS
• Logistics
• Clinic Manager
• Operations

Other Considerations
In the event this plan is activated, a level 3 emergency will be declared and we will need to close schools or other public buildings designated as clinics.
A full-scale decontamination of the school or other public building is not necessary or recommended. Institutional cleaning products commonly used during normal cleaning in facilities is sufficient.

Public Health Preparedness Planning: Next Steps

• Medical Reserve Corp development
  – CWRU/Red Cross/Public Health initiative
  – Form a Medical Reserve Corp : CWRU, Academy of Medicine and Public Health
Volunteer Recruitment
• Form a Community Emergency Response Team
  – ARC and Community Emergency Coordinator
• All volunteers would receive training and some type of certification
• Additional training opportunities would be available
• ARC is developing a volunteer recruitment strategy and model to be shared with all communities in the county

Public Health Preparedness Planning: Next Steps
Community Awareness Training – March 27
• Convene Emergency Coordinators, Police and Fire Chiefs, School and city officials, local volunteers
• Walk through a simulated Mass Vaccination Clinic
• Debriefing
• Overview of CCBH Mass Care Plan
• Planning: City and School activities
• MOU, Facility Survey, 24/7 Contact
• Managing and Staffing a clinic: ARC
  – Establishing a Volunteer Coordinator

Your Roles and Responsibilities in Preparedness Efforts
• Know your community’s disaster plan and partners (emergency coordinator)
• Communicate regularly with your emergency coordinator or volunteer coordinator
• Know the schools and/or public buildings in your community that may be used as shelters or mass care facilities

**Role and Responsibilities of Schools in Preparedness Efforts**

• Share information to increase awareness in the community

• Be a community volunteer and assist with recruitment of others

CDC will take additional steps to increase preparedness to respond to a smallpox exposure of any magnitude, including updates to the Smallpox Response Plan and Guidelines. Updates on infection control, in-hospital isolation recommendations, post-event vaccination protocols, and outbreak response strategies are under way and will be posted on the CDC website.

References

Conybeare ET. Illness attributed to smallpox vaccination during 1951-60. Mon Bull Minist Health Public Health Lab Serv 1964;23:126-133.
Neff JM, Lane JM, Fulginiti VA, Henderson DA. Contact vaccinia -- transmission of vaccinia from smallpox vaccination. JAMA 2002;288:1901-1905.[ISI][Medline]
Contact spread of vaccinia from a recently vaccinated Marine -- Louisiana. MMWR Morb Mortal Wkly Rep 1984;33:37-38.[Medline]
Andreev VC, Lachapelle JM, Rook AJ. An outbreak of accidental vaccinia in a family. Dermatol Int 1969;8:5-9.[Medline]
Brav A. Accidental vaccinia of the eyelid with disciform keratitis. Arch Ophthalmol 1945;33:67-67.[ISI]
Horgan ES, Haseeb MA. Some observations on accidental vaccinations on the hands of workers in a vaccine lymph institute. J Hyg (Lond) 1944;43:273-274.

From the Methodist Medical Center, Dallas, Texas.
Publications

Resources and Contact Information
www.cdc.gov/smallpox and www.ccbh.net
Cuyahoga County Board of Health
Rebecca Hysing