

Smallpox Fact Sheet

Smallpox, because of its high case-fatality rates and transmissibility, now represents one of the most serious bioterrorist threats to the civilian population. Over the centuries, naturally occurring smallpox, with its case-fatality rate of 30 percent or more and its ability to spread in any climate and season, has been universally feared as the most devastating of all the infectious diseases.

Smallpox was once worldwide in scope; before vaccination was practiced almost everyone eventually contracted the disease. In 1980, the World Health Assembly announced that smallpox had been eradicated and recommended that all countries cease vaccination. That same year, the Soviet government embarked on an ambitious program to grow smallpox in large quantities and adapt it for use in bombs and intercontinental ballistic missiles. That initiative succeeded.

Russia still possesses an industrial facility that is capable of producing tons of smallpox virus annually and also maintains a research program that is thought to be seeking to produce more virulent and contagious strains.

An aerosol release of smallpox virus would disseminate readily given its considerable stability in aerosol form and epidemiological evidence suggesting the infectious dose is very small. Even as few as 50-100 cases would likely generate widespread concern or panic and a need to invoke large-scale, perhaps national emergency control measures.

Several factors fuel the concern: the disease has historically been feared as one of the most serious of all pestilential diseases; it is physically disfiguring; it bears a 30 percent case-fatality rate; there is no treatment; it is communicable from person to person; and no one in the U.S. has been vaccinated during the past 25 years. Vaccination ceased in this country in 1972, and vaccination immunity acquired before that time has undoubtedly waned.

Smallpox spreads directly from person to person, primarily by droplet nuclei expelled from the oropharynx of the infected person or by aerosol. Natural infection occurs following implantation of the virus on the oropharyngeal or respiratory mucosa.

Contaminated clothing or bed linen could also spread the virus. Special precautions need to be taken to insure that all bedding and clothing of patients are autoclaved. Disinfectants such as hypochlorite and quaternary ammonia should be used for washing contaminated surfaces.

A smallpox outbreak poses difficult problems because of the ability of the virus to continue to spread throughout the population unless checked by vaccination and/or isolation of patients and their close contacts.

Between the time of an aerosol release of smallpox and diagnosis of the first cases, an interval of as much as two weeks is apt to occur. This is because there is an average incubation period of 12 to 14 days.

After the incubation period, the patient experiences high fever, malaise, and prostration with headache and backache. Severe abdominal pain and delirium are sometimes present. A macopapular rash then appears, first on the mucosa of the mouth and pharynx, face and forearms, spreading to the trunk and legs. Within one or two days, the rash becomes vesicular and later pustular. The pustules are characteristically round, tense and deeply embedded in the dermis; crusts begin to form about the eighth or ninth day. When the scabs separate, pigment-free skin remains, and eventually pitted scars form.

Approximately 140,000 vials of vaccine are in storage at the Centers for Disease Control and Prevention, each with doses for 50-60 people, and an additional 50-100 million doses are estimated to exist worldwide. This stock cannot be immediately replenished, since all vaccine production facilities were dismantled after 1980, and renewed vaccine production is estimated to require at least 24-36 months.

In 2000, CDC awarded a contract to Oravax of Cambridge, Massachusetts to produce smallpox vaccine. Initially producing 40 million doses, Oravax anticipates delivery of the first full scale production lots in 2004.

Treatment of smallpox is limited to supportive therapy and antibiotics as required for treating secondary bacterial infections. There are no proven antiviral agents effective in treating smallpox.

Recommendations of the Working Group include testing and ultimate consideration for FDA approval of a vaccinia strain grown in tissue culture rather than on calves, finding a rapid diagnostic test for smallpox virus in the asymptomatic early stages, and developing a more attenuated strain of vaccine.

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