

What is smallpox?

Smallpox is a virus that has been around for centuries. When people caught smallpox, they got sick with fever and chills, then broke out in a painful rash that left disfiguring scars. It was particularly prevalent in the 1700 - 1800's until the introduction of cowpox inoculation (by Edward Jenner in 1796) and the development of a smallpox vaccine. Through aggressive interventions by the World Health Organization (WHO), smallpox was officially eradicated worldwide in 1980.

What are the symptoms of smallpox?

Smallpox starts out as a nonspecific viral illness including fever, chills, fatigue, prostration, headaches and backaches about 2 weeks following exposure. The incubation period actually ranges between 7-17 days. A characteristic rash then develops predominantly on the face (and inside the mouth), arms and legs 2-3 days after the onset of fever. The rash starts as flat red spots, then turn into blisters and deep pustules during the course of the next week. These pustules are deeply imbedded into the skin and are firm, round and painful. The sores then crust over and scabs form similar to chickenpox, generally by day 14. Two to three weeks later after the scabs heal and separate, pitted scars are often left behind.

When is the smallpox patient infectious?

Smallpox patients are most infectious during the first week of the rash. At this time, patients have sores in their mouths. These sores release smallpox virus into the patient's saliva. The virus may spread through the air when the infected person breathes, talks, laughs, or coughs. A patient is no longer infectious after all the scabs have fallen off, usually about 3 or 4 weeks after the start of the rash.

How is smallpox different than chickenpox?

Although smallpox and chickenpox can be easily confused there are some important differences that readily distinguish one from the other. First, smallpox blisters all happen at the same time and are at the same stage of development (synchronous), whereas chickenpox occurs in waves with different crops of blisters and the sores are therefore at different stages of development (asynchronous). Secondly, smallpox blisters occur primarily on the face, hands and legs (including palms and soles), whereas chickenpox has a tendency to concentrate on the chest, abdomen and back. The other big difference between smallpox and chickenpox is their cycle of infectivity. Chickenpox is very infectious 1-2 days before there is any symptoms, but once all the blisters have scabbed then the person is no longer contagious. With smallpox, the person is contagious once they get sick with the fever, chills and rash. They continue to be infectious until all the scabs have fallen off.

How is smallpox diagnosed?

Trained health professionals can diagnose smallpox just by recognizing its typical presentation, without requiring any special laboratory tests. The WHO and the Centers for Disease Control (CDC) have had much experience with smallpox outbreaks and have a lot of helpful information for distinguishing smallpox from chickenpox and other viruses. For confusing cases or definitive smallpox confirmation, specimens can be sent to a highly specialized and secure lab for identification by electron microscopy.

How serious is smallpox?

Death may occur in 30% of patients who have never been vaccinated. Survivors are generally left with significant disfiguring scars from the smallpox blisters.

Is there any cure for smallpox?

Unfortunately, there is no cure for the smallpox virus. We can prevent the disease by vaccinating people prior to being exposed to the virus. If exposed to a known active case of smallpox, vaccinating that person within 4 days can either prevent or lessen the severity of the smallpox infection. Current research is focusing on finding new antiviral medications to treat smallpox once infected with the smallpox virus.

How is smallpox spread?

Smallpox is primarily spread from one person to another by infected saliva droplets, particularly during the first week of illness. They are infectious from the time when a person starts to experience symptoms until all the smallpox scabs are healed. Smallpox is very contagious, consequently if we ever had a true outbreak there would probably be a quarantine of some kind. ***FACT:** Although smallpox is highly contagious, it has a lower rate of transmission than measles, chickenpox, pertussis and influenza. Infection occurs most frequently among those individuals that have considerable face-to-face exposure, such as household members and close contacts of sick individuals.*

Although not as common, smallpox can also be transmitted by contact with contaminated clothing or bedding. Therefore, infected bedlinens and clothes should be decontaminated by washing with hot water and bleach. Contaminated surfaces can be cleaned with household bleach or ammonia. (per CDC guidelines)

How can we stop the spread of smallpox?

Isolation and vaccination are our primary defense against the spread of smallpox. Because of its highly contagious nature, and the fact that there's no treatment for smallpox, it is important that the disease is recognized early so that we can prevent the spread to other individuals. Patients who are sick will be medically isolated. Others who came in close contact with affected individuals will be vaccinated, observed closely

for fevers (greater than 101°F), and quarantined if symptoms develop. The majority of individuals will remain in their home or at a nonhospital facility since little medical intervention is generally needed. In this setting, vaccination will be given primarily to a distinct group of people who were directly associated with the infected patient during their infectious time period. This identification of a smallpox patient and the vaccination of all of their contacts is known as ring vaccination. If there was a major smallpox outbreak, however, then mass vaccination of the general public may be more effective and would be considered as an option.

If smallpox has been eradicated, why all the concern?

In 1980, the World Health Organization (WHO) officially declared that smallpox had been eliminated worldwide as a result of global vaccination and eradication program efforts. Although the smallpox virus no longer occurs naturally, specimens were kept at medical facilities for research purposes. There is concern that the former Soviet Union research program disseminated the virus along with the biotechnology processes to other governments and rogue regimes, which potentially place the United States and the rest of the world at risk of ill-intentioned political and terrorist groups.

What makes smallpox such a great biological weapon?

Smallpox has been shown to be easily manufactured and disseminated by the efforts of the former Soviet Union. It requires only a small amount of viral particles to cause infection and is easily spread to numerous individuals making it a very contagious disease. The fact that most people haven't been vaccinated makes a large number of people susceptible to a smallpox epidemic. Smallpox at a minimum is a very incapacitating illness and has a significant mortality rate (30%) if individuals are unprotected. Because of smallpox's notorious past, there is a significant fear factor and widespread panic and hysteria is expected if there was merely a threat of a smallpox outbreak. Finally, in the event of smallpox cases, the hospital and health care system will presumably be overwhelmed by real and hysterical individuals thereby closing down the hospital system and contributing to the mass confusion.

If there is a concern of smallpox, why don't we vaccinate?

- 1) Shortage of licensed vaccine (*the US government has made arrangements to remedy this situation.*)
- 2) Not generally warranted since smallpox was eradicated in 1980 (*last case in the United States was 1949, last natural case in the world was in 1977 in Somalia*)
- 3) Risk of side effects associated with the vaccination, including one death in every million people vaccinated. *There is concern that there would be more complications and deaths since there are now more individuals with HIV, organ transplants and cancer than previously.*

Why is there a vaccine shortage and what's being done?

Manufacturers quit producing smallpox vaccine in 1982 since there was no demand after smallpox was eradicated. The CDC had maintained a huge stockpile but the potency of some vials has waned over the years. Consequently, the CDC has contracted for the development of a new vaccine using more modern production techniques to augment the old stores. Full production is expected by 2004.

In the interval, studies have confirmed that the remaining vaccine supply can be diluted 5-fold to fulfill our current needs. The CDC and the Department of Defense has a contingency plan in place to immediately release this supply of smallpox vaccine if an emergent situation develops.

What are some of the risks of vaccination?

The smallpox vaccine is relatively safe. However, some people with preexisting conditions or immune system disorders have a higher risk of complications from the vaccine. The risks associated with the smallpox vaccination vary from mild rashes (similar to other vaccinations) to severe and fatal complications. As with many vaccinations, there may be fevers and local redness, swelling and tenderness at the inoculation site.

Encephalitis, or brain inflammation can occur 1 in 200,000 to 300,000 persons vaccinated. This complication is severe and can be fatal. Progressive vaccinia is another severe side effect associated with the smallpox vaccination but occurs rarely and primarily in those patients with impaired immune systems (1 in 1,000,000). This is associated with the vaccine virus spreading all over the body, instead of staying at the inoculation site. The most common risk of vaccination for smallpox is the transmission of the vaccine virus to other parts of the body—called autoinoculation—which commonly is introduced into the eye which can lead to blindness. In addition, people who have been vaccinated can spread the vaccine virus to other individuals who should otherwise avoid the smallpox vaccine (transmission).

Who should avoid the smallpox vaccine?

There are certain individuals who shouldn't be given the smallpox vaccine on a **routine** basis because the risk of side effects is increased in these groups of people. Pregnant women should not be given the vaccine because of the concern of fetal infection. Individuals with eczema or other chronic skin diseases often have severe eczematous reactions (*eczema vaccinatum*). People who are immuno-compromised from HIV, cancer, chemotherapy, organ transplant or medications (steroids) are at risk of severe complications known as *vaccinatum necrosum* or progressive vaccinia. Finally, because the vaccine virus can be transmitted from person to person, anyone who has a household contact with these disorders should avoid vaccination, unless segregated while the vaccine site heals.

How do I know if the vaccination worked?

Smallpox vaccine is given in a unique manner. Rather than a simple shot, the vaccine solution is inoculated into the skin with a series of rapid strokes which “jabs” the vaccine into the skin. Within a week a pustule will develop, crust over and then scab, leaving the characteristic vaccination scar. If the pock lesion doesn't develop in 3-6 days, then it is assumed that the vaccination didn't work and it should be repeated.

Will the vaccination protect me completely?

The vaccination is very effective at protecting against smallpox outbreaks (even if given within 4 days after exposure), however, not everyone's immune system is perfect and protection fades over time. One might get the disease but a more mild form than if they had never been vaccinated. The fatality rate for smallpox is only 3% with the vaccine, compared to 30% if unvaccinated!

Am I still protected if I got the vaccination previously?

It is estimated that the old smallpox vaccination may last up to a decade, but others say only 3-5 years. After that, the body has a tendency to “forget”, and that's why boosters were routinely given every 10 years. Since routine vaccinations ended in 1972 and the military ceased its smallpox vaccination program in 1990, it is assumed that the entire world's population is at risk. However, those who have been previously immunized are anticipated to have partial immunity—meaning a quicker immune response and a more mild disease course if they are exposed to smallpox as compared to somebody who has never been vaccinated. Once an individual has been infected with smallpox, then they will have lifelong immunity and can never get smallpox again.

Can I get smallpox from the vaccine?

No, because the vaccine contains a related pox (*vaccinia*) virus, not the actual smallpox (*variola*) virus. Because these two viruses are so similar, immunizing with the more mild vaccinia virus, allows immunity to smallpox without the more severe complications and risks. It was the rigorous vaccination efforts with vaccinia, that lead to smallpox's eradication from the world in 1980.

Where can I get more information?

For further information, please refer to the webpage that has been created on smallpox and other bioterrorism agents at **USNH Okinawa's website** located at: www.oki.med.navy.mil. This webpage provides general information on a variety of biological agents and has helpful links to other websites.

Another helpful website is the **Centers for Disease Control and Prevention** located at: www.bt.cdc.gov

Or, contact your local health care provider if you have further questions.

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Smallpox FAQ's Prevention and Care

