Smallpox Signs & Symptoms

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Nurses will be at the frontlines in assessing patients should a smallpox outbreak occur

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Smallpox has been around for 12,000 years and has killed more people than any other disease. Successfully eradicated by vaccination, it has not been seen in the world for the last 25 years. But with the increasing concern of a smallpox outbreak as a result of bioterrorism, knowing what to look for could mean curtailing an epidemic and saving hundreds of lives. As an ED nurse, I did some research on what I might see in my area of nursing.

Smallpox Transmission

Smallpox is caused by the variola virus and occurs in two forms historically — major and minor. Variola major is the most common form and has a 30 percent mortality rate. Under the major category of smallpox there are four types: ordinary, the most frequently occurring; modified, which is a mild form of the disease and occurs in people who are vaccinated; and flat and hemorrhagic, which are usually fatal. Variola minor carries a 1 percent rate of death.

Smallpox is released by droplets, making it largely droplet spread in transmission. A simple cough, sneeze or just talking with an infected person may expose someone to the virus. It only takes one person and it only takes inhaling one droplet to become infected. But the virus can also sometimes live on linens and clothing, causing contact transmission. This heightens its communicable risk even further.

When a person becomes infected, there is an incubation period of 7-17 days (varies with each individual). Within those days the individual is not contagious, has no complaints, works and lives a normal life.

However, when the first signs and symptoms occur, this is the signal ending the incubation period and that the individual is now contagious.

Signs and Symptoms of Smallpox

The disease is often described as flu-like once symptoms begin. Objective symptoms include headache, fatigue, severe back pain and sometimes vomiting. During the 1-4 days of this prodromal period, the individual will have a fever of >101¡ F and will feel extremely sick, frequently needing to be bedridden. The fever will often decline as the rash appears.

This rash can become the most important observation a nurse will make when trying to determine treatment and isolation. The rash occurs first as an enanthem in the mouth and then progresses from the mucous membranes of the

mouth and nasal passages to the face and eventually the forearms and trunk. The soles of the feet and palms of the hands are also notable areas where one may observe the rash. The rash, however, will be denser over the face and distal extremities.

The rash is initially a macular lesion that progresses through papular to vesicular lesions filled with fluid. Since this disease has been eradicated, we might believe this rash is chickenpox or impetigo. A smallpox lesion is firmer and deeper in the skin, compared to chickenpox, which is more superficial. Also, and more importantly, smallpox develops and spreads slowly, all the lesions going through each stage from vesicular to pustules to scabbing at the same time. Chickenpox rash is also characterized by a central distribution, most prominent on the face and trunk.

Treatment

Treatment should start with differential diagnosis; isolation in a negative pressure room should be initiated. Family members or anyone who has come in contact with the affected patient during the infectious period should be vaccinated.

Notify your local health department immediately. All communicable diseases must be reported to the state or regional Bureau of Communicable Diseases. Supportive treatment may be needed for pain, fluid and electrolyte disorders and complications that may include sepsis, pneumonia, arthritis, encephalitis and shock.

Secondary infections must be considered, because the immune system becomes compromised with smallpox. Acute sinusitis, tonsillitis, pneumonia and cellulitis are just a few secondary infections that may occur. This will vary with each individual case, depending on the patient's health history. People with diabetes may be more at risk for cellulitis. COPD patients may be more at risk for pneumonia.

Anti-infectives will be considered as well as antiviral drugs. Although it has not been substantiated because antiviral drugs were not around 25 years ago when the last known case of smallpox was treated, it is believed that antiviral drugs, such as cidofovir, may be effective against variola virus and are being tested for their effectiveness.

Smallpox is deadly. People with smallpox are contagious until all the scabs have fallen from the skin, as long as 21 days. Smallpox carries a 30 percent mortality rate.

To date, there is no known cure for smallpox. Vaccination is really a person's only protection. However, there are significant guidelines concerning the vaccination. First, if a person has been infected, they must be vaccinated during the incubation period. Once signs and symptoms develop, the vaccine may not be effective.

Anyone allergic to polymyxin B sulfate, streptomycin sulfate, chlortetracycline hydrochloride and neomycin sulfate should not be vaccinated. These antibiotics are in the vaccine.

Since the vaccine creates immunity in anyone who has been immunized, people with suppressed immune systems should not receive the vaccine, unless it is clear they have been exposed to the disease. The vaccine is not the variola virus; it will not give you smallpox. However, it is a live pox-type virus. The virus can cross the placenta and may cause stillborn or death to the fetus, so it is not recommended for pregnant women.

The virus can spread through an open skin rash, such as eczema, causing increased risk of transmission and possibly skin-related infections. Many may be considered contraindicated for the vaccine. The risk of exposure or acquiring the virus itself should be considered when weighing the benefits and risks of the vaccination, since exposure to those who are immunocompromised or transplant patients can cause them to contract the disease.

Administering Vaccine

The vaccine itself is given with a bifurcated needle, which holds a droplet of vaccine. It pricks the skin about 15 times, very rapidly, but not deeply like an intramuscular injection. It can be administered on the arm or thigh. The area will turn red and bumpy and will itch in 3-4 days.

Remember that this site is contagious and can spread smallpox to other parts of the body or to other people if precautions aren't taken. While it is not suggested that the site of the vaccination be covered with a dressing, an immunized person should remain apart from any at-risk person until the scab falls off the vaccination site, after approximately 21 days. A porous bandage can be put over the site, but it must be changed frequently. Also the bandage must be discarded in a sealed plastic bag to decrease any possibility of contamination to others.

Make sure patients know that the first week after immunization the area will blister, form pus and drain. The second week it should dry up and scab. The third week the scab should fall off. Until the scab falls off, that site may be contagious. Also, some may experience flu-like symptoms from mild to severe. If erythema is reported in 48 hours, this suggests a hypersensitivity indicating that virus replication did not occur. The individual must be revaccinated.

Individuals who have been vaccinated before 1972 (the last year the vaccine was administered) most likely have little immunity left for prevention of all disease, but are likely to be substantially protected against severe disease and death. Since it is unclear how much protection remains now, in the event of an epidemic, it is recommended these people be revaccinated.

If a person has had smallpox, it is rare for them to get it a second time. However, verifying such histories today is likely to be difficult and, without clear documentation of a disease history, these persons should be vaccinated.

Resources

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