

Smallpox vaccination advice

National Advisory Committee on Immunization. Statement on smallpox vaccination. *Can Commun Dis Rep* 2002;28:1-12.

Background: Although the last naturally occurring case of smallpox was reported in 1977, the virus was not completely destroyed. Stocks of the variola virus are maintained in 2 World Health Organization (WHO) reference laboratories in the United States and in Russia. There are concerns, however, that samples of the virus may fall into the hands of terrorists. Responding to the threat, the US government is stockpiling over 200 million doses of smallpox (vaccinia) vaccine and sufficient supplies of vaccinia immune globulin (VIG).¹ Canada has a much more limited supply of vaccine (about 365 000 doses), and the WHO has about 500 000 doses.

Smallpox is highly contagious and is spread by droplet nuclei. Widespread airborne transmission has rarely been documented. Since close face-to-face contact is required for transmission, most infections occur among household members and among people (e.g., unprotected health care professionals) who have close contact with an infected person.

The primary strategy to control a smallpox outbreak is early identification of new cases and rapid containment. Containment includes isolation of the infected person (in their home or, if in hospital, in a negative-pressure ventilated room equipped with high-efficiency particulate air [HEPA] filtration), vaccination of people in close contact with the case (those living in the same household and medical staff) and vaccination of people living in the same households as those in contact with the infected person. This primary containment strategy was responsible for the previous elimination of the virus, even in countries where vaccination coverage was low.

In Canada smallpox vaccination of the general population was stopped in 1972 and of health care workers in 1977. The Canadian Forces stopped it in 1988.

Thus, few Canadians born after 1972 have been vaccinated. It is believed that most people vaccinated before 1972 no longer have adequate residual immunity.

Question: In light of the terrorist threat to use smallpox as a biological weapon, is routine smallpox vaccination of the general public and health care workers necessary?

Design: The National Advisory Committee on Immunization (NACI) was asked to review the need for routine smallpox vaccination.

Results: The vaccine is believed to be efficacious. Over 95% of people vaccinated for the first time achieve antibody titres of more than 1:10, a level believed to provide sufficient protection.

The risk of adverse events from vaccination is substantial. Adverse events associated with vaccinia vaccine are viral encephalitis (about 1 in 300 000 vaccinations; about 25% result in permanent neurological damage and 15%–25% are fatal), vaccinia necrosum (a gradual spreading of the primary vaccinia lesion to involve adjacent skin, bone and viscera, with necrosis of tissue) and generalized vaccinia (resulting from blood-borne dissemination of the virus). The overall rate of severe adverse events is about 1.3 per 1000 vaccinated individuals. In addition, inadvertent inoculation of close contacts of people who have been vaccinated may occur. Common sites of such autoinoculations are the face, eyelid, mouth and genitalia. VIG is useful in treating some of these adverse events.

People at high risk of adverse events include those with compromised immune systems, eczema or other serious exfoliative skin conditions, and pregnant women. Nonetheless, people with contraindications to vaccination should be given the smallpox vaccine and VIG simultaneously if they have been in close contact with an infected person.

NACI does not estimate the likelihood of smallpox being used as a biological

weapon in Canada. It notes that the WHO has maintained its recommendation against vaccination of the general population. NACI also recommends against mass vaccination at this time. The US Centers for Disease Control and Prevention (CDC) also does not recommend mass vaccination, estimating the risk of a biological attack to be low. However, there is dissenting opinion.^{2,3}

Commentary: Because of the severity and frequency of adverse effects of smallpox vaccination, the international consensus and Canadian recommendations for vaccination are reasonable. Recommendations in the United States and elsewhere are likely to change. At the time of writing, a US advisory committee recommended vaccination of about 500 000 emergency department staff and other hospital workers.⁴ Such vaccinations would be voluntary.

Practice implications: Physicians should refresh their knowledge of smallpox. Most will never have seen a case. The CDC's smallpox Web site (www.bt.cdc.gov/agent/smallpox/index.asp) has good colour pictures of the lesions and other clinical information. The CDC also has a Rash Illness Evaluation team that will help with diagnosis and serologic testing (tel 770 488-7100 or 404 639-2888).

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References

1. Advisory Committee on Immunization Practices (ACIP). *Draft supplemental recommendations of the ACIP: use of smallpox (vaccinia) vaccine, June 2002*. Under consideration by the US Centers for Disease Control and Prevention and by the US Department of Health and Human Services. Available: www.bt.cdc.gov/agent/smallpox/vaccination/acip-guidelines.asp (accessed 2002 Oct 18).
2. Weir E. Does smallpox still pose a threat? *CMAJ* 2001;165(10):1380.
3. Devlin HR. Smallpox still poses a threat. *CMAJ* 2002;166(8):1012.
4. Altman LK. Smallpox inoculation urged for employees of hospitals. *New York Times* 2002 Oct 17. Available: www.nytimes.com/2002/10/17/health/17VACC.html?pagewanted=print&position=top (accessed 2002 Oct 18).