

Editorial

Smallpox: A 21st Century Killer?

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Today, the idea of smallpox heralded as a bioterrorist weapon has mobilized health forces. Perhaps there is something US intelligence knows about the terrorist's access to the smallpox virus and their intention to use it as a weapon. Regardless, as individual citizens who should make informed decisions, the facts of the known risks of the smallpox vaccine ought to be discussed, as well as other ways to ameliorate the disease should it surface.

The term *vaccine* was derived in the 18th century when Edward Jenner reported that inoculation with vaccinia (the infectious agent known to cause cowpox) protected people from smallpox. Smallpox is a highly contagious infection caused by variola, a virus very similar to the cowpox virus (vaccinia). Jenner was the first to actually develop immunization, with the term vaccine generated out of his early experimentation.

The smallpox scourge went on for centuries: in 1967, millions of cases were reported in Asia and Africa. In 1977, the last known case was reported in Somalia, signifying the success of the vaccination campaign based on science that eradicated the infection from the globe.

Despite the success, government-run laboratories in the United States and the Soviet Union have kept stocks of the virus. There is ongoing conjecture that recent financial constraints in Russian government laboratories might have allowed for some of the virus to become available for bioterrorist use. Since smallpox is a highly contagious and fatal disease, claiming the lives of 30% of those exposed, it is of great concern.

So here is the dilemma: the U.S. stopped vaccinating Americans in 1972, some 30 years ago. If smallpox should re-emerge through an act of terrorism, would citizens be protected? Should we preemptively vaccinate Americans for protection against the disease? Are we willing to accept the vaccine's risks, which are likely to include an increased morbidity and mortality for recipients?

The major reason not to begin vaccination in the absence of actual exposure to variola or cases of smallpox is the complications of vaccination. It has been known for decades that this live vaccine, which produces a local infection in the skin, can occasionally produce a life-threatening progressive lesion or spread even in those who are healthy.

Further, even those who are unvaccinated are susceptible to infection as they can have reactions if the virus spreads to them from those who have been vaccinated. It is estimated that two people per million vaccinees will develop progressive vaccinia or *vaccinia gangrenosa*; four people per million will develop encephalitis.

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This is a great communication and policy challenge as there are so many unknowns and “what ifs”. One should recall that it was only during the anthrax scare in 2001 that U. S. Secretary of Health and Human Services Tommy Thompson “calmed” American’s fears by guaranteeing there would be enough smallpox vaccine for every American. The debate and dialogue on the actual risk of exposure, the harms of the vaccine itself, and the “cost” to assure public health are blighted by the rhetoric of the “war on terrorism” and protection of homeland security. If we followed Thompson’s suggestion, we would have over 250 deaths from the vaccine itself (one in a million) and a multitude of cases of encephalitis and other vaccine induced illness. There are more ways to be prepared than just a “pre-attack” mass vaccination.

Prior to mass vaccination, a number of policy options ought to be considered with appropriate risk and benefits shared and debated with experts, citizens, and professionals.

First, prepare by guaranteeing access to the vaccine only after it is confirmed that smallpox is indeed available and deployable as a terror weapon. In fact, even if variola is used, a system for vaccination in the area of exposure in the three to four days post-exposure offers significant protection against a fatal outcome. In fact, it is unclear if those born before 1972, who were immunized, might still have some immunity to the fatal disease.

Second, we should explore effective anti-viral medications that might reduce the fatalities of those exposed and unvaccinated. The drug Cidofovir (Vistide), used in AIDS-related viral eye infections, prevents death and disease in primates with monkey-pox—similar to smallpox in humans. Research and support for developing Cidofovir and other related anti-virals might offer an effective treatment.

Third, there is an effective treatment to treat severe reactions, vaccinia immune globulin (VIG). VIG was used in the past to treat and reduce the severity of any of these complications, but currently little is available. Until 1968, at least 40 individuals per million vaccinees developed significant and possibly life-threatening complications for which VIG was used.

Today, there is only a hypothetical risk for smallpox exposure — hence, no real hazard or risk. Yet, the risks of vaccination are known: Unlike routine childhood and flu shots, the smallpox vaccine carries known risks even for healthy people, with life threatening reactions in 15 of every million vaccinated and an estimated death rate of one or two per million.

Communication can assist Americans to become more risk literate and weigh a hypothetical risk of being exposed to smallpox with a small, but real risk of vaccine related death or illness. This communication could include a discussion of compensation and support in the case of adverse effects from the vaccine.

Communication of exclusion due to vulnerability is also necessary beyond pregnant women, children under the age of one, and people of known immune-compromised status. Serious negative consequences might occur in others with masked or undiagnosed diseases. Should there be laboratory tests for hepatitis B and C, HIV or others? Also, what about the over 15 million Americans who suffer from or have a history of eczema?

Finally, communication can assist policymakers to make prudent decisions to mobilize public health forces if a case occurs. First responders—paramedics, firefighters and police officers—might join the military as preferred recipients. Hospital workers and ring vaccination could follow along with VIG and other potential anti-virals.

Clearly, this is not a simple policy response. Ongoing communication with professionals and policymakers is paramount concomitant with ethical media coverage. Public health is at risk if faulty communication leads to decisions that threaten the very basis of our public health system. The World Health Organization preamble should be a guiding

principle of our efforts: “Informed opinion and active cooperative on the part of the public are of the utmost importance in the improvement of health of the people.” We should hope we never see a case of smallpox ever again, but if we do, we should be prepared to protect the public health with a mobilized instant response to limit its scourge.