

SPECIAL ARTICLE

## The Public and the Smallpox Threat

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ABSTRACT

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### BACKGROUND

The potential for a bioterrorist attack involving smallpox has led to a debate about what national precautions should be taken. What is unclear is the public's knowledge of smallpox and views about precautions.

### METHODS

We conducted a national survey of 1006 adults selected by means of random-digit dialing. Respondents were asked about their knowledge of and beliefs about the smallpox virus and the vaccine, their possible reactions to a bioterrorist attack involving smallpox, and a number of proposed state emergency powers.

### RESULTS

The majority of the respondents have a number of beliefs about smallpox and smallpox vaccination that are false. The majority believe that there is an effective treatment for smallpox, that there have been cases of smallpox in the past five years, and that there is not enough smallpox vaccine to vaccinate everyone in the United States. Thirty percent believe that vaccination earlier in their lives would protect them from the disease. The majority of respondents said they wanted to be vaccinated; however, only 21 percent would want to be vaccinated if physicians declined vaccination. There was strong support among the respondents for several proposed state emergency powers.

### CONCLUSIONS

Our results suggest the need for public education about smallpox. These data also point to the importance of a discussion in the medical community about the advisability of vaccination of individual physicians at this time.

**G**OVERNMENT INTELLIGENCE REPORTS warn of the possibility of bioterrorist attacks involving smallpox. This possibility, coupled with the potential for military action against Iraq, which is thought to have biologic weapons, has raised the question of what national precautions against a smallpox attack should be taken.<sup>1,2</sup> The ongoing debate,<sup>3-6</sup> which has been covered extensively in the media and professional journals, centers on three issues: whether front-line health care workers should be vaccinated now,<sup>7</sup> whether it is appropriate to make smallpox vaccination available to the general public,<sup>8-12</sup> and whether states should be given additional emergency powers to respond to bioterrorist attacks.<sup>13,14</sup>

What is not known is how the general public views these issues. Prior research has shown that public opinion can strongly influence policy decisions.<sup>15-17</sup> Also, should there be an outbreak of smallpox, the public response will be based on people's current knowledge and beliefs.<sup>18</sup> To aid public health officials and physicians in planning for a possible outbreak, we conducted a national survey of Americans to learn their views on each of these questions and to discuss their implications.

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## METHODS

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### STUDY DESIGN

We used random-digit dialing to select survey participants. A total of 1006 U.S. adults completed the survey, which was conducted by telephone by ICR/International Communications Research between October 8 and December 8, 2002. The response rate was 65 percent.<sup>19</sup> The sampling error was 3.1 percentage points.

### SURVEY QUESTIONNAIRE

The questionnaire was pretested for length and comprehensibility. It consisted of 61 questions, 7 of which had multiple parts.

Respondents were asked about their knowledge of the smallpox virus and vaccine and about their beliefs about equitable distribution of the vaccine in the event of a bioterrorist attack involving smallpox. They were also asked whether they would be vaccinated (or revaccinated) if the vaccine were made available. Respondents were told that there was a risk of serious side effects, including death, from the smallpox vaccine.

Respondents were asked where they would seek treatment and how confident they were in their own

physician's ability to recognize the symptoms of smallpox. They were asked about their views on six possible emergency powers, proposed by the Centers for Disease Control and Prevention, which the states could invoke in the event of a bioterrorist attack.<sup>20</sup> Respondents were told that on the basis of these emergency powers, states could arrest those who refused to obey a quarantine or isolation order, be vaccinated, or undergo a medical examination.

To adjust for sampling biases due to sociodemographic differences between respondents and nonrespondents and to ensure that the sample was representative, we weighted the responses on the basis of the latest U.S. Census data for sex, age, race or ethnic group, level of education, number of people in the household, and number of land telephone lines.

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## RESULTS

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### CONCERN ABOUT A SMALLPOX ATTACK

The majority of the respondents (64 percent) said they believed that an attack by terrorists using smallpox would be likely if the United States took military action against Iraq; 20 percent thought it would be very likely, and 44 percent thought it would be somewhat likely (Table 1).

### KNOWLEDGE ABOUT SMALLPOX

Eighty-nine percent of the respondents knew that smallpox is a contagious disease (Table 1). However, 30 percent believed that there had been a case of smallpox in the United States in the past five years, and 63 percent thought there had been a case somewhere in the world in the past five years (Table 1). Moreover, 78 percent believed that there was a medical treatment for smallpox that would prevent death or serious effects after symptoms of the disease developed.

### BELIEFS ABOUT SMALLPOX

A majority of the respondents believed it was likely that they would survive if they contracted smallpox (very likely, 50 percent; somewhat likely, 37 percent). Two thirds of the respondents (67 percent) thought it was likely that they would contract smallpox if they came within a few feet of someone who had the disease (very likely, 26 percent; somewhat likely, 41 percent). The respondents were split on the aftereffects of smallpox, with 48 percent reporting that most people who contracted the disease and survived would have a full recovery and

**Table 1. Beliefs about Smallpox.\***

Belief	Respondents (%)
Likelihood of a smallpox attack in the event of military action against Iraq	
Very likely	20
Somewhat likely	44
Not very likely	27
Not likely at all	8
Don't know or refused to answer	1
There have been cases of smallpox in the past 5 years	
In the United States	30
Somewhere in the world	63
There is effective medical treatment for smallpox	78
Smallpox is contagious	
Yes	89
No	8
Don't know or refused to answer	3
Likelihood of contracting smallpox if respondent came within a few feet of someone who had the disease†	
Very likely	26
Somewhat likely	41
Not very likely	18
Not likely at all	5
Don't know or refused to answer	2
Likelihood of survival if respondent contracted smallpox	
Very likely	50
Somewhat likely	37
Not very likely	7
Not likely at all	4
Don't know or refused to answer	2
Most people who contracted smallpox and survived would	
Recover fully	48
Have permanent, serious aftereffects	46
Don't know or refused to answer	6

\* A total of 1006 persons participated in the survey.

† The 111 respondents who did not believe smallpox was contagious were not asked this question.

46 percent reporting that they would have permanent, serious aftereffects such as disfigurement and blindness.

#### THE SMALLPOX VACCINE

Sixty-six percent of the respondents believed that they had previously been vaccinated against smallpox (Table 2). Forty-six percent of those who reported a prior vaccination (30 percent of all respondents) believed it would protect them from becoming seriously ill if there were an outbreak of smallpox.

A large majority of the respondents (93 percent) believed that the smallpox vaccine would be effective at preventing a person from contracting smallpox if the person received the vaccine before being exposed to the virus (very effective, 54 percent;

somewhat effective, 39 percent). However, only 42 percent believed that vaccination within a few days of exposure could prevent a person from contracting the disease.

Respondents were asked to assess their own level of risk from the smallpox vaccine. Twenty-five percent said it was likely that they would die from the vaccine, although only 6 percent thought this was very likely. Forty-one percent believed it was likely that they would have a serious illness (very likely, 11 percent; somewhat likely, 30 percent). A majority of the respondents reported that it was likely that they would have a fever or feel extremely tired (very likely, 33 percent; somewhat likely, 47 percent) and would have a sore arm (very likely, 57 percent; somewhat likely, 34 percent). Only about one quarter of the respondents (27 percent) believed that someone who has physical contact with a recently vaccinated person could contract a serious infection.

#### VACCINATION POLICY

The respondents were asked about two of the policy issues currently being debated: vaccination of health professionals and vaccination of the general public. A strong majority (81 percent) of the respondents favored voluntary vaccination of doctors and nurses in preparation for a bioterrorist attack. Nearly two thirds (65 percent) were in favor of offering the smallpox vaccine to the general public now on a voluntary basis, in preparation for a possible attack.

Many respondents believed that they would not be able to get vaccinated quickly if cases of smallpox were detected in their community and that there would not be enough vaccine for everyone in the United States (Table 2). Moreover, 72 percent believed that if it was not possible to vaccinate everyone quickly, wealthy and influential people would get the vaccine first; 43 percent believed that the distribution of the vaccine would discriminate against the elderly, and 22 percent believed that it would discriminate against blacks.

#### THE VACCINATION DECISION

Sixty-one percent of the respondents said they would choose vaccination (or revaccination) if it were offered as a precaution against a bioterrorist threat, whereas 36 percent said they would not. Seven percent reported having a health condition that led them to believe they should not be vaccinated.

If there were cases of smallpox in the United

**Table 2. Beliefs about Smallpox Vaccine.\***

Belief	Respondents (%)
Previous vaccination for smallpox	
Respondent was vaccinated previously	66
This previous vaccination would prevent serious illness if there were an outbreak	46†
Effectiveness of the smallpox vaccine if a person has never been exposed to smallpox	
Very effective	54
Somewhat effective	39
Not very effective	3
Not effective at all	2
Don't know or refused to answer	2
Vaccination within a few days of exposure would prevent a person from contracting smallpox	42
Likelihood of side effects in a vaccinated (or revaccinated) person	
Death	
Very likely	6
Somewhat likely	19
Serious illness	
Very likely	11
Somewhat likely	30
A fever or extreme tiredness	
Very likely	33
Somewhat likely	47
A sore arm	
Very likely	57
Somewhat likely	34
Someone who has physical contact with a recently vaccinated person can contract a serious infection	27
Doctors and nurses should be vaccinated	81
The general public should be vaccinated only if there is an actual case of smallpox	35
Vaccination should be made available to the public now on a voluntary basis	65
If an outbreak of smallpox occurred in the respondent's community:	
Respondent could be vaccinated quickly if he or she wanted to be	40
There would be enough doses available to vaccinate everyone	27
There is enough smallpox vaccine to vaccinate everyone in the United States in the event of a smallpox attack	16
If an outbreak occurred and not everyone could be vaccinated quickly:	
Wealthy and influential people would be vaccinated first	72
Elderly people would be discriminated against	43
Blacks would be discriminated against	22
Would choose vaccination if it were offered as a precaution against a terrorist attack	
Yes	61
No	36
Don't know or refused to answer	3
Would want to be vaccinated if:	
Cases of smallpox were reported in the respondent's community	88
Cases of smallpox were reported in the United States	75
Respondent's doctor and most other doctors decided to be vaccinated	73
President Bush and his family decided to be vaccinated	66
Cases of smallpox were reported somewhere in the world	65
Respondent would have to stay out of work for two weeks	44
Respondent heard that some people had died from the vaccine	33
Respondent's doctor and many other doctors refused to be vaccinated	21
Would not choose to be vaccinated	9

\* A total of 1006 persons participated in the survey.

† The 654 respondents who reported that they had been vaccinated were asked this question.

**Table 3. Possible Responses to a Smallpox Attack.\***

Response	Respondents (%)
If you thought you had smallpox, where would you go first for diagnosis or care?	
Own doctor	52
Hospital emergency room	40
Public health department	7
None of these†	1
Level of confidence that respondent's doctor could recognize the symptoms of smallpox	
Very confident	43
Somewhat confident	40
Not very confident	10
Not at all confident	5
Don't know or refused to answer	2
Would agree to be quarantined for 2 to 3 weeks if exposed to smallpox but did not have symptoms	95
Would agree to be isolated for 3 to 4 weeks if smallpox diagnosed	77
If cases of smallpox were reported in the respondent's community:	
Would stay in the community	67
Would stay elsewhere until the outbreak was over	32
Don't know or refused to answer	1
If respondent thought he or she had been exposed to smallpox:	
Would stay in the community	91
Would leave the community	7
Don't know or refused to answer	2
Favors requiring hospitals and health clinics to provide services to people who may have smallpox	87
Favors requiring people with smallpox to be isolated in a special health facility, with the possibility of arrest for those who refuse	73
Favors quarantining people suspected of having been exposed to smallpox, with the possibility of arrest for those who refuse	57
Favors requiring a person to undergo a medical examination or test to determine whether the person has smallpox, with the possibility of arrest for those who refuse	51
Favors requiring people to be vaccinated against smallpox, with exceptions made for those with medical conditions and with the possibility of arrest and quarantine in a special facility for those who refuse	41
Favors giving the governor the authority to use National Guard troops to prevent people from leaving communities where there have been outbreaks of smallpox	67

\* A total of 1006 persons participated in the survey.

† This was a volunteered response.

States, 75 percent of the respondents would choose to be vaccinated. If there were cases of smallpox in the community, the proportion of respondents who would be willing to be vaccinated increased to 88 percent.

The actions of physicians also influenced the decision to be vaccinated. Seventy-three percent of the respondents said that they would be vaccinated if their own physician and most other physicians were vaccinated, as compared with 21 percent if their own physician and many other physicians refused vaccination.

Only 33 percent of the respondents would choose to be vaccinated if they had heard that "some people" had died from smallpox vaccine. Only 44 percent would be willing to be vaccinated if they had to stay out of work for two weeks. A small proportion of the respondents (9 percent) said that they would not be vaccinated under any of these circumstances.

**POSSIBLE REACTIONS TO A SMALLPOX ATTACK**

Approximately half the respondents (52 percent) said they would go to their own physician first for diagnosis and care if they thought they had smallpox, 40 percent would go to a hospital emergency room, and 7 percent would go to their local health department (Table 3). Most of the respondents were confident that their own physician would recognize the symptoms of smallpox (43 percent were very confident, and 40 percent were somewhat confident).

Ninety-five percent of the respondents said they would agree to be quarantined for two to three weeks if they were exposed to smallpox but did not have symptoms of the disease. Seventy-seven percent said that if they were told they had smallpox and needed to be isolated in a special health facility with other patients with smallpox for three to four weeks, they would agree to go to the facility.

Two thirds of the respondents (67 percent) said that they would stay in the community if cases of smallpox were reported there, and 32 percent said they would stay elsewhere until the outbreak was over. However, 91 percent reported that they would stay in the community if they thought they had been exposed to the virus.

**STATE EMERGENCY POWERS**

As shown in Table 3, there was a high level of support for legislation requiring hospitals and clinics to provide services to people who might have smallpox (87 percent of the respondents favored such legislation) and requiring people with smallpox to be isolated in a special health facility (73 percent). Two thirds of the respondents (67 percent) believed that state governors should be able to use National Guard troops to prevent people from leaving areas

with reported cases of smallpox. A smaller majority favored quarantining people suspected of having smallpox (57 percent), and the respondents were divided on the question of whether a person should be required to undergo a medical examination or test to diagnose smallpox, with 51 percent favoring this requirement and 48 percent opposing it. The only proposal not favored by 50 percent or more of the respondents was the requirement that a person be vaccinated against smallpox (41 percent favored this proposal).

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#### DISCUSSION

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This survey revealed substantial misinformation among Americans about smallpox and smallpox vaccination. Our data show that the majority of the public would agree to vaccination and other measures to control smallpox, but that they would not agree to be vaccinated if physicians declined vaccination.

Our results should be interpreted in the context of the limitations of this study. Respondents were interviewed about these issues in the absence of any recent experience with a smallpox outbreak or vaccination. The answers given might differ if there were an outbreak of the disease. The survey was administered at one point in time and the stability of the responses over time is not known. In addition, all surveys are subject to sampling errors. The size of the sampling error varies according to the number of people interviewed and the magnitude of the difference in the responses to each question. The results may differ from those that would have been obtained if all adults in the United States had been interviewed.

Our findings have several important implications for physicians and public health professionals. First, our data highlight the central part that physicians would play in providing advice and care related to smallpox vaccination and treatment. If the threat of a smallpox attack increases, Americans' individual decisions about vaccination will be strongly influenced by what practicing physicians choose to do. If physicians are reluctant to be vaccinated, large numbers of Americans will be unwilling to do it voluntarily. Also, if there are deaths from side effects of the vaccine, the public will be less willing to be vaccinated and will look to their physicians for advice. The majority of the survey respondents reported that they would go to their own doctor, rather than an emergency room or a public health department, if they thought they had small-

pox. Thus, primary care physicians will be on the frontlines in helping their patients decide about vaccination and in the event of a smallpox outbreak.

Second, the survey results suggest the need for public education about smallpox, since many Americans have beliefs about the disease that are incorrect according to scientific views. Although many aspects of the disease remain unclear, there is general agreement in some important areas. The last case of smallpox was reported in the United States in 1949 and in the world in 1977,<sup>21</sup> yet a substantial proportion of the respondents thought there had been cases in the past five years. There is no specific treatment for smallpox,<sup>21</sup> but a majority of the respondents thought that the disease could be effectively treated. In many people, immunity from a prior vaccination is likely to be negligible after 20 years, and the U.S. vaccination program ended in 1972,<sup>12,22,23</sup> yet almost half of the respondents who had been vaccinated believed they would be protected from the disease. A majority of the respondents did not know that vaccination within two to three days after exposure to smallpox can provide protection against the virus.<sup>21,24</sup> Although serious adverse reactions to the vaccine are expected to be relatively rare in patients without contraindications to the vaccine,<sup>23,25</sup> a substantial proportion of the respondents thought that serious complications from the vaccine, including death, would be likely. Government sources say there are enough doses of the vaccine for everyone in the United States,<sup>26</sup> but the majority of the respondents did not believe that there would be enough doses for everyone.

Third, our results suggest that the current view held by many public health officials and leaders of the medical community — that the smallpox vaccine should not be widely available to the general public — is at odds with the public's desire for access to the vaccine. Health officials need to clarify to the public the basis for their judgment to limit access to the vaccine.

Finally, the recent statement by the Bush administration about the plan to begin vaccinating military personnel and health care and emergency workers against smallpox within weeks, with immunization of the public offered on a limited, voluntary basis in the future,<sup>27</sup> may make this issue more salient to the public. As adverse reactions to the vaccine occur, members of the public may look to their physicians for guidance in weighing the risks of vaccination against the risk of a bioterrorist attack involving smallpox.

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