BRIEF REPORT

Reasons Physicians Accepted or Declined Smallpox Vaccine, February Through April, 2003

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From February to April 2003, we performed an e-mail-based survey to assess responses of physicians at Yale University to being offered smallpox vaccine. Of 58 respondents, 3 (5%) had been or intended to be vaccinated. Reasons cited for declining vaccination included: belief that benefits did not outweigh risks (55%), belief that the vaccination program was unnecessary (18%), desire to wait and see what side effects occurred in vaccinees (11%), and worries about compensation or liability (7%). Most (94%) considered risks to themselves, family, or patients in their decision. Only 3% thought a smallpox attack in the next 5 years was likely or very likely. Physicians did not accept the smallpox vaccine because they did not believe the potential benefits were sufficient.

KEY WORDS: attitudes; smallpox vaccine; survey; vaccination.
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Beginning in late January 2003, in anticipation of possible bioterrorist attacks using smallpox, the smallpox vaccine was offered to health care professionals as the first phase of a program to vaccinate the U.S. civilian population.¹ The goal of this phase of the program was to vaccinate an adequate number of health care professionals who then would be part of a first response team in the event of a bioterrorist attack.^{1,2} The program met with resistance from the professional community. Reflecting this resistance, the Institute of Medicine reported that during the months before the vaccine was offered, many health care workers did not consider themselves to be at risk for smallpox, were worried about transmitting vaccinia to their patients, and were concerned about lack of compensation in the event of an adverse reaction to the vaccine.^{2,3}

It is important to understand physicians' beliefs about the smallpox vaccine because their response to a vaccination program can determine its success. Physicians' opinions were critical during the initial phase of the program when a limited

group of health care workers were being vaccinated because physicians' responses to the program may indicate how other health care workers and the general population will respond in the future. The general population will be influenced by how physicians respond, and physicians will counsel their patients based on their own opinions of the vaccine and vaccination program.⁴ The objective of this study was to determine why physicians faced with actually being offered vaccination against smallpox decided to accept or decline it from February to April 2003.

METHODS

We performed an e-mail-based survey of physicians who had been offered the smallpox vaccine through Yale University.⁵ All physicians at Yale have e-mail accounts and routinely receive messages by e-mail. We sent questionnaires to all attending physicians listed in the directories for relevant departments. The questionnaire included questions about whether physicians intended to receive or had received the smallpox vaccine, as well as 2 open-ended questions about why they made their decision about whether to be vaccinated. The questionnaire also included 28 closed-ended questions about previous vaccination against smallpox, contraindications for smallpox vaccine, and beliefs about the vaccine and the smallpox vaccination program. The questions were piloted on 10 physicians who were not offered the vaccine and would not be included in the study; then a preliminary questionnaire was e-mailed to 30 randomly selected physicians who were included in the study. Based on responses from those 30, the questionnaire was finalized and e-mailed to the remainder of the group.

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Timeline

The questionnaire was sent by e-mail 4 times between February 16 and April 11, 2003. Dates for vaccination were February 12 and May 12, 2003. The timing of the survey was deliberately chosen to coincide with the vaccination process so that physicians would be actively involved in deciding whether to be vaccinated.

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On December 12, 2002, letters offering the live-virus, vaccinia vaccine were mailed to persons who were eligible to receive the vaccine. These letters were sent by the Hospital Epidemiologist and the Director of Occupational Health. The letters discussed the vaccination process, facts about smallpox, and contraindications and risks of the vaccine. Each department with eligible personnel received copies of the letter and was asked to distribute it to relevant persons. Educational sessions to discuss the vaccine, vaccination process, risks, and contraindications were held December 17 through 20, 2002 and January 7 through 9, 2003. Persons interested in being vaccinated met individually with either the director of occupational health or the hospital epidemiologist before the date of vaccination. Letters offering smallpox vaccination again and describing updated information about adverse events were sent on April 28, 2003 to the same group of health care workers who received letters in December 2002.

Analysis of Open-ended Information

We analyzed the open-ended questions, asking why the physician did or did not receive the vaccine, using an analytic method called content analysis.⁶ Using this method, we categorized the responses by the main theme of the response; each response could fit into more than 1 category. For example, one response read, "I have not been presented with compelling information to support that a threat is posed to justify the risk, be it however small, of the vaccine.... Additionally, it was not clear to me that my disability insurance would cover me in the case of an adverse reaction." This response was placed in both the category of "the benefits do not outweigh the risks" and the category of "worried about issues of compensation and liability." The categorizations were reached by consensus of 2 authors (ALB, ESH).

RESULTS

We sent questionnaires to 141 physicians. We received responses from 84 (60%); of those 84, 17 (20%) did not recall being offered the vaccine and therefore were excluded to ensure that we only included persons who had actively made a decision about vaccination. Of the remaining 67 who were eligible, 9 (13%) elected not to participate; and 58 (87%) completed the questionnaire and were enrolled in the study. Because of incomplete answers, as some persons did not answer all of the questions, the number of responses varies for each question. The characteristics of the respondents are shown in Table 1. Most, 42 (73%), had been vaccinated previously, 7 (12%) had not, and 9 (16%) were unsure if they had been vaccinated previously. Only 3 physicians (5%) received (2 [3%]) or intended to receive (1 [2%]) the vaccine. Another 12 (21%) stated that they were undecided about vaccination; yet they had missed the February date for vaccination, and, according to the records at Occupational Health, no physicians were vaccinated in May or at any other times. Because we know that no other

Table 1. Characteristics of Respondents, N = 58

Characteristic	
Median age, y (range, IQR)	42 (33 to 71, 39 to 54)
Male, % (n)	69 (40)
Specialty,* % (n)	
Emergency, adult	18 (10)
Infectious disease, adult	14 (8)
Infectious disease, pediatric	12 (7)
Dermatology	12 (7)
Intensive care/pulmonary, adult	12 (7)
Nephrology, adult	11 (6)
Ophthalmology	7 (4)
Emergency, pediatric	7 (4)
Intensive care, pediatric	4 (2)
Pulmonary, pediatric	2 (1)
Nephrology, pediatric	2 (1)
Contraindications—in participant or a close contact,† % (n)	38 (22)
Eczema*	9 (5)
Weakened immune system*	0 (0)
Pregnancy*	2 (1)
Breast feeding*	0 (0)
Allergy*	0 (0)
Chronic active skin condition*	0 (0)
Other*	2 (1)
Eczema in a close contact	23 (13)
Weakened immune system in a close contact	9 (5)
Pregnancy in a close contact	7 (4)
Chronic active skin condition in close contact	0 (0)
Close contacts with other conditions	0 (0)
Attended an educational session provided by Yale-New Haven Hospital,‡ % (n)	11 (6)

* N = 57.

† A close contact was defined as "someone with whom you have personal or physical contact, such as a family or household member; for these questions, your patients are not considered close contacts."

‡ N = 56.

IQR, interquartile range.

physicians were vaccinated, the overall proportion of physicians who were vaccinated was 2 out of 141 (1.4%).

The reasons that physicians gave in response to open-ended questioning for why they were or were not vaccinated are listed in Table 2. The majority, 55%, were not vaccinated because they felt that the potential benefits of the vaccine did not justify its risks (e.g., "I do not feel that the risk of disease at this point is high enough for me to get immunized; there is probably a higher risk of complication from the vaccine than benefit"). Twenty-five percent indicated that they were not vaccinated because of the presence of a contraindication to the vaccine, 18% because they felt that the smallpox program was unnecessary (e.g., "I do not think that we have enough data to support mass vaccination"), 11% decided to wait and see what the actual risks and benefits of the vaccine were (e.g., "I would also like more time to hear about the rate and types of adverse outcomes among individuals already vaccinated"), 7% were

Table 2. Responses to the Open-Ended Questions Asking Why Physicians Did or Did Not Receive the Smallpox Vaccine

Response	n	%*
Reasons physicians gave for why they were not vaccinated (N = 55)		
Did not feel the benefits outweighed the risks	30	55
Presence of a contraindication in themselves or in a close contact	14	25
Felt that the smallpox vaccination program was unnecessary	10	18
Wanted to wait and see what side effects occurred as other people were vaccinated	6	11
Concerned about compensation and liability in case of a complication	4	7
Felt the risk to their patients was unacceptable	4	7
Felt that being contagious would interfere with work	4	7
Did not want to be on the medical response team	2	4
Did not trust the government's motives for vaccination against smallpox	2	4
Believed that if a case of smallpox occurs, vaccine would be readily available	2	4
It was inconvenient to go to get vaccinated	1	2
Believed they were protected by their previous vaccination	1	2
Reasons physicians gave for why they were vaccinated or intended to be vaccinated (N = 3)		
Role as infection control personnel for hospital	3	100
Desired to set example for other volunteers	1	33
Wanted to protect self from exposure to smallpox	1	33
Necessity for someone to be on the smallpox response team	2	67

* The percentages do not sum to 100% because each individual physician could report more than one reason for why they were or were not vaccinated.

worried about compensation or liability issues in case of an adverse reaction (e.g., "Federal government has not settled compensation and liability issues satisfactorily"), and 4% did not trust the government's motives for vaccinating against smallpox (e.g., "I have no faith that the current administration in Washington is doing anything more than generating fear in the public to justify its agenda in Iraq"). Three of the 4 physicians (75%) who were worried about issues of compensation or liability worked in the emergency department.

Responses to 14 of the 28 closed-ended questions are shown in detail in Table 3. In response to closed-ended questions, 98% of physicians (57/58) considered the risks and benefits when making their decision about vaccination (data not shown); 63% (32/51) responded that the benefits of the vaccine did not outweigh the risks (Table 3). Three separate questions asked whether physicians considered risk to themselves, their patients, or their family; among respondents who answered all 3 questions, 94% (49/52) considered the risk to themselves, their patients, or their family when making their decision about vaccination (data not shown). Sixty-eight percent (36/53) considered whether they might transmit vaccinia to their patients if they were vaccinated (Table 3). Most respondents, 84% (48/57), considered the necessity of the program when making their decision about vaccination (data not shown); yet, only 48% (25/52) felt that the smallpox program was necessary (data not shown), and only 45% (23/51) trusted the government regarding smallpox (Table 3). Ninety percent (52/58) considered the likelihood of a smallpox attack when making their decision about vaccination (data not shown), and only 3% (2/56) felt that a smallpox attack in the United States was likely or very likely to occur in the next 5 years (Table 3). Forty-four percent (24/54) considered

issues regarding compensation and liability when making their decision (Table 3).

DISCUSSION

At this hospital, less than 3% of physicians who were offered vaccination against smallpox received the vaccine. Respondents declined vaccination because they were not convinced that the benefits of vaccination outweighed the risks—risks not only to themselves but also to their families and patients. Respondents felt that the smallpox program was unnecessary; and without having a more detailed description of the chance of smallpox, several wanted to wait and see how safe the vaccine was. Compensation and liability in the event of adverse reaction were also issues, although they were less prominent and were primarily cited by physicians who worked in the emergency department. This clustering may reflect conversations among those physicians. The few physicians who were vaccinated felt obliged to do so because of their roles in the hospital epidemiology department.

Although the sample in this study was small and limited to one institution, the timing was ideal for capturing physicians' attitudes during the period when they were actively deciding about vaccination. Additionally, the use of an open-ended question allowed us to evaluate the complete range of beliefs and concerns held by physicians.

With very few physicians vaccinated in this area of Connecticut, the region may be insufficiently prepared for an outbreak of smallpox. At the time of this study, the risks of the vaccine were perceived by most to strongly outweigh its benefits; this situation is likely to have worsened due to reports of adverse cardiac events.^{7,8} To improve acceptance of the vaccine among physicians, federal public health authorities

Table 3. Responses to Closed-Ended Questions About Vaccination

Question and Responses		n	%
I believe that the potential benefits of the smallpox vaccine outweigh the potential risks.*	Strongly disagree	5	10
	Disagree	27	53
	Agree	19	37
	Strongly agree	0	0
I believe the smallpox vaccination program is necessary.†	Strongly disagree	5	10
	Disagree	22	42
	Agree	23	44
	Strongly agree	2	4
I trust the government regarding smallpox.*	Strongly disagree	5	10
	Disagree	23	45
	Agree	21	41
	Strongly agree	2	4
What do you think is the chance of a case of smallpox occurring in CT in the next 5 years?‡	Very likely	0	0
	Likely	2	4
	Somewhat likely	3	5
	Somewhat unlikely	4	7
	Unlikely	23	41
	Very unlikely	24	43
What do you think is the chance of a case of smallpox occurring anywhere in the U.S. in the next 5 years?‡	Very likely	2	3
	Likely	0	0
	Somewhat likely	6	11
	Somewhat unlikely	12	21
	Unlikely	24	43
	Very unlikely	12	21
Did you consider the following beliefs when making your decision about being vaccinated?			
I wanted to prevent myself from getting smallpox.‡	Did not consider	13	32
	Did consider	38	68
	Strongly considered	5	9
I wanted to prevent myself from spreading smallpox to other people if I got exposed to the disease.*	Did not consider	12	24
	Did consider	27	53
	Strongly considered	12	24
I was concerned that I would miss work or other activities because of feeling sick after getting the vaccine.§	Did not consider	28	52
	Did consider	19	35
	Strongly considered	7	13
I was concerned that I would have a life-threatening complication of the vaccine.†	Did not consider	19	37
	Did consider	27	52
	Strongly considered	6	12
I was concerned that my patients would become seriously ill because I was vaccinated.	Did not consider	17	32
	Did consider	26	49
	Strongly considered	10	19
I was concerned that a family member or a close contact would become seriously ill because I was vaccinated.	Did not consider	18	34
	Did consider	20	38
	Strongly considered	15	28
I was worried about compensation and liability issues in case side effects of the vaccine developed in me or in people with whom I am in contact.§	Did not consider	30	56
	Did consider	13	24
	Strongly considered	11	20
I wanted to do what Yale or Yale-New Haven Hospital wanted me to do.§	Did not consider	42	78
	Did consider	11	20
	Strongly considered	1	2
I wanted to be able to help out if there were cases of smallpox.§	Did not consider	11	20
	Did consider	31	57
	Strongly considered	12	22

* N = 51.

† N = 52.

‡ N = 56.

§ N = 54.

|| N = 53.

should acknowledge the degree of uncertainty regarding the probability of an outbreak of smallpox, provide physicians with as clear a description as possible of the likelihood of an outbreak, and provide techniques to minimize the risk of transmitting vaccinia to contacts. For a smallpox vaccination program to succeed using this live-virus vaccine, physicians need to be provided with more compelling reasons to be vaccinated.

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