

How to Vaccinate 30,000 People in Three Days: Realities of Outbreak Management

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How do we begin to look at our level of bioterrorism preparedness? I will address this issue as part of a “collective experience.” There are no textbooks or even book chapters that describe this problem. There is no way to define it.

I congratulate the New York City Department of Health for their work with West Nile virus. It brings back memories of when, in 1982, I was in charge of a program to spray malathion in 287 Minnesota cities located over 45,000 square miles because of an outbreak of western encephalitis. In addition, our group worked up the single largest food-borne outbreak in this country, with 240,000 cases of salmonellosis from contaminated ice cream. My discussion focuses on a *Neisseria meningitidis*, serogroup C, outbreak and our response, which involved a large community-based immunization program. However, not one of these prior experiences gives us the answer to the question I just asked, although they do offer a common vision of what the future might be, a vision that, I might add, concerns me because we have not really absorbed its meaning at the local, state, and federal levels.

An Outbreak of *Neisseria meningitidis*, Group C, in Mankato, Minnesota

- Super Bowl Sunday, 1995;
- Nine cases (1 death) occurred in two clusters within a month;
- Community-wide immunization program initiated when cases “moved out” of the high school population.

The outbreak we experienced occurred, as they usually do, on a weekend. A telephone call came in on the Saturday morning of Super Bowl weekend in 1995 to Dr. Richard Danila. Three students in the community of Mankato, Minnesota, all from one high school, had been hospitalized in the previous 12 hours at the local hospital with suspected *N. meningitidis* infection. All three were in serious or critical condition. What transpired over the next month were actually two separate clusters involving nine cases and one death, resulting in an immunization program in which ultimately 30,000 of 55,000 Mankato residents were vaccinated. *N. meningitidis*, particularly serogroup C, is the strain that causes most concern in terms of cluster outbreaks, which occurred during the mid-1990s. College campuses have often been a focus for these outbreaks.

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Let me walk you through the experience as we had it unfolded for us. By Saturday morning we recognized that we had an outbreak. We continued to investigate the cases throughout that day. On Sunday, a fourth child was admitted to the hospital with meningitis. On Sunday evening we met with the representatives from the local medical community, the hospital, and local public health and elected officials. We brought the media in very early and decided that we would need to vaccinate students in one of the two high schools in that town. All four victims attended that school. Later that night, we expanded the program to all high school and junior high students based on the potential for additional transmission. The immunization clinic was planned for Tuesday morning. It took us that long to get the vaccine in the community and develop plans for mass immunization.

Issues Confronting the Community Response

- Panic and fear;
- Surveillance/medical care;
- Communication system(s);
- Vaccine and antibiotic distribution;
- Public relations;
- Political considerations;
- Medical community relations;
- Cost.

The immunization clinic was quite remarkable. We vaccinated 1,000 students in 35 minutes. Public health officials, in conjunction with local health personnel, have the ability to do some remarkable things. We had multiple vaccination lines set up. This all happened within the context of a school setting under a very controlled situation with a very well-defined system for obtaining consent. You can't do that for the general public clinics. It's the difference between how you handle prisoners versus the general public. As the week went on, we still had just the four students who had become ill the previous weekend. However, we subsequently identified an elderly woman who presented with meningitis midweek. She had contact with the students; therefore, we believed that this person was part of the school outbreak.

We thought things were winding down. We had immunized 3,300 people against *N. meningitidis* using a combination of personnel from public health, the local hospital, and volunteers from the nursing community. The panic and fear had not yet set in. People were concerned but not scared. On Friday morning, however, just as we thought the outbreak was over, I received a dreadful call. A high school junior was ad-

mitted to the hospital with rapidly progressing meningococcal disease. At 10:30 he was pronounced dead. A second student had also just been admitted. Both students had received their vaccine on Tuesday. It obviously had not yet had time to provide protection.

I spent several hours that afternoon with the parents of the boy who died. He happened to be exactly the same age as my daughter. I wanted so desperately to go home and kiss my daughter goodnight later that evening. I couldn't. I went back to my hotel room at 2:30 a.m. and got up at 5:00 a.m., just like all the others responding to the outbreak. We often don't appreciate the toll that situations like this take on the responders and caregivers.

We also had to cope with the classic news issue. Unfortunately, this outbreak happened during February, which is television news ratings month in this country. So this became the sweeps month story for most of the midwest television media. We had satellite trucks throughout the town. On the whole, the media did a good job, particularly the local media. However, there were examples of a single media mistake making for a major issue. On Sunday night of the second weekend, one reporter, thinking he had heard the mayor say all schools would be closed the next day, reported this live at the 10 o'clock news on the top news channel in Minnesota. We then had to deal with the confusion surrounding this one reporter's error for the next 3 days.

There is a huge distinction between live media and print media. I urge, as we talk about media, that we not lump them into one category. There is a difference that's very important in terms of potential for mistakes. TV news is live. It can't be corrected by a copy editor.

We had a second weekend of watching and worrying. We now had to vaccinate additional individuals. Every student in the Mankato area was now going to be vaccinated. At times like this, people are looking for someone to make them feel confident and reassured. I'm not sure that I offered that voice at that time. However, it was ironic that I had just assisted in writing the American Academy of Pediatrics Red Book Committee, or Committee on Infectious Diseases, guidelines on how to respond to a meningitis case in the community. That credential gave many local people the sense that I must know what I'm talking about. They didn't know that I, too, was winging it as we went along. However, I think that's a very important issue: You've got to have somebody who people believe is in charge and can give credible answers.

One parent was extremely angry and wanted the schools closed. Previous studies of these types of out-

breaks had shown that transmission of *N. meningitidis* likely was through intimate contact such as saliva sharing, which occurs when students share beverages. Amazingly, when this father kept his daughter home that next Monday, a group of other female classmates went to her house, where they had a party and drank from the same soda cans. Again, what people may perceive as risk reduction may be risk enhancement. What you say about risk reduction may not be believed by the community, a not uncommon occurrence. Ultimately, we could trace most of the students—those who were patients—back to a single party that took place the weekend before the outbreak began.

We tried to reinstate a sense of normalcy after this immunization program, about 2 weeks after the outbreak began. Our staff had, up to this point, been working nonstop for 23 days, often 18 hours a day. We no sooner completed this outbreak response when an outbreak of invasive streptococcal group A disease occurred in an area near Rochester, Minnesota. Seven cases appeared over a several-week period. Four patients died. We did not have a moment to “recover” from the Mankato outbreak. We went to Rochester, in the middle of this substantial outbreak, which was the second news media story for sweeps month. We still had staff working 18-hour days. Sure enough, we were just getting the Rochester outbreak settled when all hell broke loose again in the Mankato area. A new case of *N. meningitidis* infection was confirmed, caused by the outbreak strain. The patient was a grade school child, and one not thought to be in contact with previous at risk children. Then a second patient was admitted, this time a college student in Mankato.

We couldn't skip a beat. We went right back into it. At this point, it was clear that the outbreak was no longer contained to the original group of students. It was in the community. It was much larger. We knew we had to vaccinate most of the population, particularly those younger than 35. In a 4-day period, we vaccinated 26,000 people, up significantly from the original estimate of 20,000. The logistics were a nightmare. We established a single site for the immunizations: a U.S. Army Reserve location. We chose this site because of traffic management and the fact that it was available.

Along with immunizations, we also administered the antibiotic rifampin. All of the rifampin came in bulk quantity. In Minnesota you have to be a registered pharmacist to dispense medications. We had to get special emergency permission from the Board of Pharmacy to have public health personnel count rifampin by hand. We also had to make it up into a liquid simple syrup for pediatric doses, which was a nightmare in itself. We literally called in every phar-

macist we could find in the state of Minnesota to help with this effort.

Waiting in long lines in Minnesota is not intolerable, unless the line is outside during the middle of winter when the elements are harsh. Our immunization lines were blocks long. We also had traffic jams. We finally worked out a transportation system whereby people could drive to a satellite area, park their cars, and be transported to the facility via buses. On the first day, 6,000 people received immunizations. Over a 4-day period, we vaccinated 23,452 individuals. Adding to that number the original 5,800 students we vaccinated, a total of 30,000 people were vaccinated. The outbreak had finally ended.

What did it mean for us? Well, first, there was a lot of panic, even in this situation. We actually had truckers who would not drive through this community. This was a unique problem because the community was on a main highway in Minnesota and, for weightbearing purposes, heavy trucks can only go on certain highways. Some truckers literally went a hundred miles out of their way to get from Town A to Town B just so they wouldn't have to drive through this community.

Panic erupted partly because the outbreak involved an infectious agent, it did not appear to be easily controlled, and it preyed on all of our psychological fears. No one knew who was next, when was it going to strike, and where was it going to hit. Unlike natural disasters, biological agents take on a whole new dimension for panic and fear.

What were some of the lessons learned? Panic and fear were front and center, even though *N. meningitidis* is not a respiratory-transmitted agent. The panic and fear that we saw were mild compared with what would happen in a situation involving a shortage of vaccine and a respiratory-transmitted agent such as smallpox.

Surveillance and medical care must be kept up and ongoing. Anyone who had a flu-like illness came in to the hospital for an examination. Every parent thought that their son or daughter was another kid dying of meningitis. Their child woke up one morning with a fever, the same way as the boy who died.

The emergency room in this community was overwhelmed. In fact, we had to set up a separate emergency room in the hospital for those who had flu-like symptoms. That was a major triage issue, trying to figure out who was a potential case and who wasn't. Remember, this occurred during flu season, and so we had the two diseases occurring simultaneously.

We often think of a communication system as an electronic, person-to-person, secure system. However, when trying to communicate with professionals who are already overwhelmed, it's more than just the “elec-

tronics of it.” This element must be considered in communication planning. If people are working 18 hours a day, how do you get them to take half an hour each day so you can deliver an update. It’s critical that they know what’s going on, so you have to force communication. Some people may think that sounds unnecessary, but it is not.

As for the general public, we had to set up a phone bank. We brought down two different phone exchanges in one day. Very few of us thought far in advance about setting up a multiline phone system that can handle thousands of extra calls. You’ve got to have that in place, and then you’ve got to know how you’re going to staff it. In this outbreak, every nurse at the hospital worked many overtime hours, both as a nurse on staff and as a volunteer on the phone bank.

The vaccine and antibiotic distribution was a critical element to our response. We were fortunate to be able to get meningococcal vaccine flown in from Pennsylvania, although we did have the usual problems of weather. This outbreak occurred in the middle of winter. We actually had a flight that was missed because of snow at O’Hare Airport.

Cost is also an issue to consider. The provision of the vaccine cost the state of Minnesota \$1.2 million. My annual budget for the Acute Diseases Epidemiology Section at the Minnesota Department of Health at that time was about \$2.2 million for the entire year. At first, we thought we were going to have to absorb this cost. Fortunately, the state legislature did provide an emergency appropriation. The hospital was never reimbursed; they took a heavy financial hit.

In terms of stockpiling, we had to pay very little attention to that, but it is a key issue. The officials maintaining the federal stockpile have to listen to local authorities about how distribution is going to work best. If you have to spend substantial time accumulating the biologicals and antibiotics and repackaging them, you have another staffing issue.

Also, we must pay attention to vaccine and antibiotic storage and security. We didn’t have a problem with this in Mankato. However, I anticipate that it will be an issue in future outbreaks where vaccines are in short supply.

Administration presents another series of issues:

- Have enough professional staff available. Ultimately, more than 600 people were involved in this outbreak response.
- Select the right location for vaccine and antibiotic distribution. The site must be able to accommodate the traffic and security. Thousands of people will converge there.

- Crowd control is a must. Very few people truly understand what it means to have crowd control in a setting where lines last for hours. We had people who literally waited out in the cold for hours to get their young children immunized. In addition, nervous, panicked people become more frustrated.
- Vaccine and antibiotic eligibility must be determined. Although we actually had people who were scared away from this community, there were also people who came from 30 to 50 miles away to get vaccinated because they thought it was going to hit their community next. How do you determine who is eligible? You don’t have time to sit there and argue with panicked individuals. If you have a very limited supply of vaccine or antibiotics for a high-risk group, how do you respond to that? Another significant issue is consent, particularly for minors, and then you run into the problem of contraindications.
- Public relations is a key piece of the puzzle. I think all of the comments that have been made about the media are very important.
- Political considerations are important. We were lucky in that several of us were well known to Minnesota’s political leaders. We involved them early on in the outbreak. The governor of Minnesota, who participated in the first bioterrorism symposium held 18 months ago, was someone with whom I had worked closely. So he kept sharing with the media that he was convinced we were doing the right thing. That was very helpful! However, I know that when you can get into a political crossfire between a local and a state official, there can, and likely will, be a “melt-down.”

Last, but not least, is the issue of medical community relations. Typically, the medical community is too busy to be involved in this planning, but when the outbreak is in their backyard and they need to be seen as the trusted voice, how do you communicate with them to support a certain program? This is particularly difficult when they aren’t part of the planning and don’t know what’s going on. Initiating work with your medical community at the time an outbreak occurs is kind of like trying to drain the swamp when you’re up to your “tail” in alligators. That is something that’s got to be done now, not later. You’ve got to get the medical community on board.

In conclusion, the outbreak of meningitis in Minnesota pushed one of the premier state health systems in this country to the edge. After an informal survey of

state epidemiologists, I doubt that any state health department in this country could vaccinate more than 10,000 people per day with their available resources. Over Thanksgiving weekend 2000, some 300,000 people came to the Mall of America in the Twin Cities. Look at any large city in this country, such as Minneapolis-St. Paul, with 2.5 million people, and you do the math. If we can only vaccinate 10,000 people a day, you can estimate how long it will take to get the job done. This time frame is totally unacceptable. There is no local system in this country that's prepared to deal with this type of event. A federal, state, and local partnership must be coordinated immediately in the event we have to provide vaccine and antibiotics in a very short period of time.

This outbreak response is an indicator of our level of ability to respond to a bioterrorism event. The facts aren't pretty from where we stand right now. No one could do much more than what we did in Minnesota, and we have premier health care and public health systems. If we had needed to vaccinate 100,000 or 200,000 people instead of 35,000, it would have meant the difference between being told to walk across the street versus being told to walk across the country. I would have probably just given up and said, "It can't be done." This issue must be addressed immediately, or I fear that, if this terrible event does happen, a lot of people will be thinking, "Well, it just can't be done."