A Shot in the Rear, Not a Shot in the Dark: Application of a Mass Clinic Framework in a Public Health Emergency

PAUL CAMPBELL ERWIN, MD,
MPH^{a,b}

LORINDA SHEELER, PhD^{a,c}

JOHN M. LOTT, RN, MS^d

SYNOPSIS

An outbreak of foodborne hepatitis A infection compelled two regional health departments in eastern Tennessee to implement an emergency mass clinic for providing hepatitis immune serum globulin (ISG) to several thousand potentially exposed people. For the mass clinic framework, we utilized the smallpox post-event clinic plans of the Centers for Disease Control and Prevention (CDC), although the plans had only been exercised for smallpox. Following CDC's guidelines for staffing and organizing the mass clinic, we provided 5,038 doses of ISG during a total of 24 hours of clinic operation, using 3,467 person-hours, or 1.45 ISG doses per person-hour—very close to the 1.58 doses per person-hour targeted in CDC's smallpox post-event clinic plans. The mass clinic showed that CDC's smallpox post-event clinic guidelines were feasible, practical, and adaptable to other mass clinic situations.

^aEast Tennessee Regional Health Office, Tennessee Department of Health, Knoxville, TN

^bCurrent affiliation: Center for Public Health, University of Tennessee, Knoxville, TN

^cCurrent affiliation: South College, Knoxville, TN

^dKnox County Health Department, Knoxville, TN

Address correspondence to: Paul Campbell Erwin, MD, MPH, Center for Public Health, University of Tennessee, A302 Bailey Educational Complex, Knoxville, TN 37996-3400; tel. 865-974-5252; fax 865-974-8718; e-mail <perwin@utk.edu>.

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Public health departments occasionally are called on to rapidly implement mass clinics in response to disease outbreak situations. Prophylaxis against meningitis, immunization against influenza, and provision of immune serum globulin (ISG) to prevent hepatitis are examples of these occurrences. In recent years, however, such public health clinics have been used to provide prophylaxis against anthrax and to give smallpox vaccinations. When mass clinics are mobilized, health department staff usually rely on intuition and the practical realities of available resources when determining how to arrange logistics and how best to staff these clinics. There is little published information that public health officials can use for practical guidance; however, many recent publications describe the results of mass clinic exercises, especially related to bioterrorism planning.¹⁻⁴

We have used the occasion of responding to a hepatitis A outbreak with clinics to provide ISG to document inputs and outputs in a manner that could serve as practical guidance for mass clinics in the future. We also used this event as an opportunity to test the smallpox post-event clinic design established by the Centers for Disease Control and Prevention (CDC) to determine if such a clinic design is feasible and appropriate for mass clinics other than smallpox.⁵

METHODS

The outbreak

This outbreak of hepatitis A, which occurred in east Tennessee in August and September 2003, was one of three outbreak clusters (the others being in North Carolina and Georgia) that occurred simultaneously.⁶ In November 2003, another large hepatitis A outbreak occurred in Pennsylvania.^{7,8} All four outbreaks were thoroughly investigated by the appropriate local and state health departments with CDC epi-aid assistance. A total of 690 cases of hepatitis A (confirmed by serologic evidence of IgM antibody to hepatitis A virus [HAV]) were identified across these four outbreaks; the outbreak on which this article focuses included a total of 65 cases of hepatitis A, with seven of these cases in restaurant employees.

The median number of annual cases of hepatitis A in the preceding five years for the 16-county reporting area was 13. Case-control studies in each of these outbreaks identified green onions (scallions) as the likely source of infection. Food and Drug Administration (FDA) tracebacks determined that the implicated green onions were grown on two farms in northern Mexico and were likely contaminated before or during packaging and shipment. The traceback investigations

noted poor sanitation and inadequate hand-washing facilities at these farms. In November 2003, the FDA issued an import ban on green onions from these two farms.⁹

Response to the outbreak in Tennessee

Two regional health departments combined efforts to respond to an outbreak of hepatitis A. These health departments serve both metropolitan and rural regions. The metropolitan-based health department employs 350 staff and serves a county population of 380,000 people. The rural-based health department employs 450 staff, for 15 rural county health departments and a regional office, covering a population of 700,000. Thus, our combined staffs totaled 800 employees for an overall catchment population of about one million people. Disease patterns for our two regions often overlap, and the two health departments have frequently worked together on communicable disease concerns that involve both health jurisdictions.

Following confirmation of hepatitis A in employees in a local restaurant, and in several patrons of this restaurant, the two regional health departments rapidly planned for a mass clinic to deliver ISG. The number of patrons estimated to have eaten during the time for which ISG would be indicated was approximately 6,000. We established a single-site mass clinic at the main metropolitan health department facility, and planned to operate this for four days. Estimating that we would work a minimum of seven hours each day, and that it would take 15 minutes per person to provide ISG, we determined that it would require as many as 50 nurses per day to staff the clinic. We planned for an equal number of non-nursing staff, which included all other available employees among our staff.

Two greeters were posted at the entrance, guiding clients to the triage area. Triage was staffed with four non-nursing and two nursing staff. Triage asked only, "Did you eat uncooked foods or have iced drinks at this restaurant between these dates?" Clients were given a single-page registration form, a standard vaccine information sheet for ISG, and a single-page hepatitis A fact sheet. Family groups were allowed to proceed through the clinic together. Approximately 20% of the client forms (by individual or group) also included a time-flow card, which was completed by staff at various stages throughout the clinic. Clients were asked to self-report their weight; weights were measured only for those for whom an approximate weight could not be stated.

Completed registration forms were handed to hall escorts, who guided clients to one of four clinic pods. Each clinic pod was staffed with a clinic manager, two

to four clinic escorts, eight to 12 ISG injection stations, and a clerical area with one to four staff members. Each ISG injection station was staffed with two people, with almost all of these being nurses (a mixture of registered nurses, licensed practical nurses, and nursing assistants). Clinic escorts took clients from the hall escorts and positioned them directly outside of the ISG injection stations.

ISG was stocked at each station and kept in coolers. Dosing was determined using a single quick-reference sheet giving weight in pounds and dose of ISG needed. Because there are no contraindications to receiving ISG for the vast majority of the population, nursing staff required little time in getting clinical information. ISG was provided by intramuscular injection in either the gluteus (adults) or vastus lateralis (children) muscle. Nurses completed the vaccination record form and placed it in a door rack, and clinic escorts picked them up as new clients were brought to the ISG station. Injected clients were then escorted to a waiting room, where they were required to wait 20 minutes after injection. Clients were asked to keep track of this post-injection waiting time themselves, and were allowed to leave on their own.

RESULTS

During the four days of the mass clinic, 5,038 doses of ISG were administered to people potentially exposed to hepatitis A—84% of the estimated need of 6,000 doses (Table). (An additional 430 doses of ISG were given in subsequent routine clinics, but these doses were not considered part of the mass clinic data.) A total of 3,467 person-hours were documented by staff who worked in the mass clinics, yielding 1.45 ISG doses per person-hour. Usable client time-flow data were obtained from 355 data-entry cards, representing a total of 737 people (14.6% of the total individuals

given ISG). Because families were allowed to proceed through together, per-person times were determined by dividing by the number of clients for each sample. We determined the following time estimates:

- Overall per-person time from arrival at triage to completing the injection: from a minimum mean value of 6 minutes, 2 seconds per person on day 4, to a maximum mean value of 8 minutes, 58 seconds per person on day 1;
- Per person time by group size ranged from a mean of 10 minutes, 38 seconds for people coming alone, to a minimum of 3 minutes, 7 seconds for people in groups of five, increasing slightly to 3 minutes, 17 seconds per person in groups of six (Figure). The mean group size was 2.1.

DISCUSSION

In late 2002, CDC issued guidelines for establishing smallpox vaccination clinics in a post-event scenario.⁵ Each clinic unit would provide smallpox vaccinations to 5.9 people per day, with a total of 234 staff during a 16-hour period of time (two eight-hour shifts), or 1.58 doses per person-hour. We tested the validity of such an estimate by using these guidelines in providing ISG for people potentially exposed to hepatitis A, and were able to provide 1.45 ISG doses per person-hour. Using CDC's guidelines for triage, injection stations, and waiting areas, we found the smallpox post-event clinic guidelines useful and practical in actual application in a real mass clinic setting.

While the CDC smallpox post-event guidelines may be useful for guiding other mass clinic setups, much will likely depend on the specific requirements according to the illness being addressed. For hepatitis A, there are very few contraindications to ISG; in our clinic, we gathered only the most basic identifying/demographic

Table. Mass clinic hours, staffing, and ISG doses given

Day	Clinic hours	Nursing staff ^a	Non-nursing staff ^a	Number of people given ISG	Person-hours
Thursday	2 p.m. to 8 p.m.	34	21	946	565
Friday	9 a.m. to 4 p.m.	59	42	1,901	884
Saturday	9 a.m. to 4 p.m.	68	49	1,342	1,202
Sunday	12 p.m. to 4 p.m.	89	60	849	816
Total				5,038	3,467

^aNot all staff worked the full clinic hours.

ISG = immune serum globulin

Figure. Comparison of group visit and person visit to determine the most effective group size

ISG = immune serum globulin
 h:mm:ss = hour:minutes:seconds

information, and we provided a minimal amount of material that clients needed to review before receiving ISG. For other, more complicated situations (e.g., if medical screening was required before receiving treatment or if clients were required to watch videos and staff were required to gather more extensive information), the guidelines are unlikely to result in the level of efficiency we observed.

At the time of this outbreak (2003), the Advisory Committee on Immunization Practices (ACIP) was continuing to recommend ISG for postexposure prophylaxis; although HAV had been used in outbreak settings, there was limited empirical evidence on its efficacy.¹⁰ In an earlier outbreak of hepatitis A in east Tennessee that was thought to be waterborne, we had been advised to provide HAV along with ISG for postexposure prophylaxis because of the concern of ongoing exposure. Based on new clinical evidence on the use of HAV for postexposure prophylaxis, the ACIP revised its recommendations in October 2007: a single dose of HAV vaccine is now recommended and preferred over ISG for people aged 12 months to 40

years, while ISG remains the recommended postexposure prophylaxis for people older than 40 years of age.¹¹ These recommendations could be straightforwardly incorporated into a mass clinic in response to an outbreak of hepatitis A.

CONCLUSION

We were able to efficiently adapt the smallpox post-event clinic guidelines in response to a hepatitis A outbreak. We believe that the smallpox post-event guidelines are adaptable and may prove to be useful for other mass clinics.

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