

VACCINATION VENTURES
Explanation and Outcomes
of a Mass Smallpox Vaccination Clinic Exercise
held
June 17, 2003
by the
San Francisco Department of Public Health

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Structure of this Report and Contact Information

This report is intended to serve as a general guide for mass smallpox vaccination clinic planning, based on an exercise held June 17, 2003 in San Francisco, CA. Specific details of the event are not included in this report. Instead this report summarizes the overall planning, challenges, successes and the lessons learned. Attachments have been included to illustrate costs, staffing estimates, job descriptions and supplemental training and education tools.

Questions regarding this report or the June 17 exercise may be directed to:

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I. Background

Since the fall of 2002, health departments across the country have been tasked with devising smallpox post-event plans. The components of these post-event plans include epidemiological investigations, contact tracing, targeted vaccination and mass vaccination. This is accomplished through collaboration and education with local physicians and hospitals, and by working with community partners such as the police, the fire department and FBI.

For our planning in San Francisco, in a smallpox post-event worst-case scenario, it is assumed that approximately 1 million San Francisco residents and visitors could be offered vaccination. This would be accomplished by setting up approximately 40 sites throughout the city that would each be open 16 hours per day for five consecutive days. Each of the sites would have bilingual capabilities and the goal would be to move approximately 312 people through each site each hour. It is also assumed that approximately 210-235 personnel would be necessary for staffing per shift, per site. When multiplied out (# of personnel x # of shifts x # of sites), 16,000-20,000 staff members would be needed each day.

With plans on paper, it was important to test San Francisco's assumptions. Experiencing and evaluating a mock mass vaccination exercise would help to identify whether our assumptions regarding the number of staff needed, the skill mix of the staff, the patient flow, the space needs and the clinic layout were correct.

A mass clinic drill was subsequently conducted on June 17, 2003. To the best of our knowledge, this was the largest drill of its kind to test a local jurisdiction's ability to focus specifically on vaccinating large numbers of individuals within a short time frame. Nearly 200 staff and 1,350 volunteer patients participated in the daylong event. For the event, there were no needles or sharps on-site, patients were "vaccinated" with a small plastic stirring straw dipped in sterile water. The tone of the drill, however, was realistic and the paperwork and educational materials that were used would also have been used in a real emergency.

It is our hope that the information contained in this report will be beneficial for other jurisdictions planning similar events, and that this document will be useful in our own future planning efforts. We, the San Francisco Health Department, welcome comments regarding this report, and welcome other jurisdictions/agencies to use these materials for their own planning efforts.

II. Event Summary

The drill was held from 8 am to 5 pm. The agenda for the day was:

8:00 am	DPH Staff Sign In
8:25 am	General Briefing, Staff Break Area
9:00 am	Break into designated Areas for Area Trainings from Area Leaders
9:45 am	Area Leaders Reconvene in Clinic Management Area
10:00 am	Begin Seeing Patients (Doors Open)
11:30 am	Press Conference, Level 2
1:00 pm	VIP Briefing, Level 2
2:00 pm	Contacts Area and Fever/Rash Area Close for Day
3:45 pm	End of Exercise. Direct all patients to Paperwork Drop-Off and Exit
4:15 pm	Debriefing Exercise “Hot Wash” in individual areas
4:30 pm	All staff gather in Staff Break Area for large group debriefing “Hot Wash”
5:00 pm	All staff leave the building

- Approximately 1,350 patients came through the exercise.
 - 28 people came through the exercise two times
 - 16 people came through the exercise three times
 - 8 people came through 6 or more times
- 192 SFDPH staff members worked at the exercise.
- The median patient age was 42.
- 12% of patients (n=129) did not speak English at home.
- The vast majority of patients completed the exercise in 75 minutes or less (target goal was 120 minutes or less).
- Overall patient evaluation information was positive, although there was a slight difference in responses from English speakers and non-English speakers.
- Overall staff evaluation information was positive, however more training was necessary than was feasible the day of the event.
- Post drill conclusions clarify that the site layout was efficient but could be improved and that staff estimates needed to include more security personnel, more medical screeners and fewer vaccinators.

III. Event Specifics

A. The Planning Process – Project Leadership and Steering Committee

Sixty-six working days were spent to plan the entire event. *Annex 3* of the CDC document *CDC Guidance for Post-Event Smallpox Planning*, dated October 29, 2002, was used as a reference tool, as well as phone calls and different communications with other disaster planners. A preliminary meeting was held March 13, 2003 whereby consensus was reached that we should attempt a mass vaccination clinic and general goals were put on paper. The goals were as follows:

- Test our ability to provide mass screening and vaccination
 - Accommodate 310-320 patients an hour
 - Operate site in English, Spanish and Cantonese
 - Test clinic flow, skill mix of staff, space needs and crowd control
 - Address additional special patient needs
- Test our ability to recruit volunteer “patients” from the community
- Activate our Departmental Operations Center (DOC)

Between March 13 and March 28, it was solidified who would be in charge of what components of the June 17th exercise. A project manager and logistics manager were primarily responsible for putting on the event, and a *Steering Committee* was put in place that would help make policy decisions but not be tasked with detail work unless specifically asked to do so by either the project or logistics managers.

The first official Steering Committee meeting was held March 28. It was decided that weekly meetings would ensue.

Steering Committee members included:

- The Director of the Community Health Epidemiology and Disease Control Section
- The SFDPH Immunization Program Manager
- A Community Health Network Senior Planner
- The SFDPH Bioterrorism Coordinator
- The San Francisco General Hospital Disaster Planner
- An SFDPH Pharmacist/Educator
- An Emergency Medical Services Administrator
- A physician from San Francisco General Hospital
- The SFDPH Public Information Officer

Guiding principles of the Steering Committee were to make things as realistic and challenging as possible. Each time the Steering Committee had to choose an easy route (and control the situation) over a hard route, a guiding principle was to choose the harder route. In a real emergency, a natural process would occur and a group like a Steering Committee would have little control.

B. Patient Flow and Site Layout

The site layout changed multiple times and remained organic almost up until the day of the drill. In a real situation this would probably also be the case. In the end, it was decided that after being triaged, most patients would go through five primary stations:

1. Paperwork Distribution
2. Education
3. Medical Screening
4. Vaccination
5. Paperwork Drop-Off

In total, there were seventeen areas on site. These included

- Triage
- Fever/Rash or Symptoms Area
- Contacts
- Paperwork Distribution
- Education (with video)
- Screening Line
- Medical Screening
- Vaccination Line
- Vaccination
- Paperwork Drop-Off
- Mental Health
- Security
- Pharmacy
- Clinic Management
- First Aid
- Data Entry
- Staff Break Area

Each of the above Areas was assigned an “Area Leader” to train and oversee staff on the actual event day. A site schematic and a full explanation of the Area descriptions and associated staff are available in the [Appendix, Attachments 1 and 2](#).

To test triage, some patients were given roles to play (i.e. having a fever that day, being a contact of an exposed case). Most patients (95%), however, were asked to play themselves and use their real medical histories. To ensure confidentiality, we encouraged use of made-up or fictitious names.

Multiple signs were made and posted in each of the areas and on all of the entrances and exits. Entrance and exit signs were tri-lingual, and so were posters for the five primary stations. A list of all signs is included in the [Appendix, Attachment 3](#).

Bill Graham Civic Auditorium is the building that was chosen for the drill site. It is a City-owned auditorium that can hold 7,000 people, has a large main floor and surrounding smaller rooms. It was also in close proximity to the main building of the Department of Public Health (directly across the street), which would facilitate the transport of supplies. Although parking is somewhat limited in the area, Bill Graham Civic Auditorium is on all major public transportation routes (train, bus, railcar) and participants in the exercise were encouraged to take public transportation to attend the event.

C. Time Motion Study

Since testing patient flow was a primary objective of the exercise, a time-motion study was conducted in concert with the exercise. This component was contracted out to James Bowman Associates, Inc., a local consulting firm with time-motion study experience in community clinic settings. The software program used was a beta version of the CDC-developed *Patient Flow Analysis*, and this was the largest test of the software (in terms of number of patients and staff) to date.

The intention was to objectively determine how many patients could move through the clinic in the course of an hour, examine how well utilized staff would be, and examine where the bottlenecks would occur. We were also interested in learning how long each of the components of the exercise took different patients.

Ten James Bowman Associates, Inc. staff members were on-site to help facilitate data collection the day of the drill. However, SFDPH staff were responsible for most of the on-site data collection (see Appendix for [Data Collection Forms](#)). Data entry and analysis were then conducted at the offices of James Bowman Associates, Inc. To ensure that all staff were aware of the time of day, inexpensive digital watches that were pre-programmed from the factory (for synchronized time) were purchased and given to all staff working that day.

D. Costs

Excluding personnel, the event cost approximately \$95,000. All SFDPH participating received their normal pay for hours worked. Volunteer patients were not paid. Direct expenses included the costs associated with rent, supplies (medical and non-medical), equipment, the time-motion study, a public relations firm for patient recruitment, and document translation and duplication. Laptop computers and LCD projectors were also purchased for the event – but would be primarily used for future emergencies and longer-term emergency planning.

In a true emergency, it is unlikely that funds would be spent to conduct a time-motion study, or to help recruit patients via a public relations firms. Subtracting costs of laptops, the PR firm and the time motion study, the overall drill would have cost approximately \$37,119. This is a significant difference.

A more detailed spreadsheet with overall costs is in the [Appendix, Attachment 6](#), but here is a summary of the costs involved for the drill:

Items	Cost
Medical Supplies	\$2,632
General Office Supplies, Pinnies, Traffic Flow Enhancers	\$5,202
Rent, Rented Equipment, Ambulance	\$11,119
Materials Translation and Document Reproduction	\$8,466
Volunteer incentives, watches	\$4,918
Food, Water, Beverages for Staff	\$4,782
Total	\$37,119

Time Motion Study - \$15,000
PR Firm for Patient Recruitment - \$10,000
Computer Equipment for future emergencies - \$33,122

E. Staff Recruitment

Prior to the drill, it was estimated that 210-235 people were needed for staffing of the mass vaccination clinic. For liability and salary payment issues, it was decided that only SFDPH staff would work at the disaster drill. To assist with recruiting, support was sought from the Health Department Director/Health Officer and other departmental leaders to communicate the importance of participating in this event and identify all non-essential staff who could be assigned to this project.

In-house recruitment methodology included

- system-wide e-mail messages asking staff to participate for the full day
- e-mail messages to managers from the Director of Health
- postings in department-wide electronic newsletter
- presentations made at “Director’s Cabinet” meetings
- presentations made at multiple staff and management meetings
- system-wide voice mail messages
- posting sign-up sheets on the SFDPH intranet and internet sites
- word of mouth

Interested staff were asked to complete a registration form – with their supervisor’s signature - (see [Appendix, Attachment 7](#)) and fax it to a central location. The staff registration sheet asked questions about current job classifications, language skills, job skills and whether prospective staff had clinical or administrative experience. Prior to the event, all MDs, RNs and PharmDs who registered were assigned to clinical areas such as Medical Screening and Vaccination. Administrative staff whose job classifications entailed health policy or direct service work were placed in non-clinical roles (education room monitors, line monitors, paperwork distributors and receivers, e.g.) while clerical staff were assigned to runner positions and to data entry. Language was also an important determinant in assigning roles to staff in advance. It was necessary to have at least one person who spoke Spanish and one who spoke Cantonese in almost every area of the drill. Event organizers did try to best match staff with their skill sets, but if staff were to unexpectedly show up the day of the drill, it was decided they would be quickly placed in areas that were still short on staff.

Recruitment was slow going. In the event of a real emergency, all city staff are considered disaster workers and would be required to report to a disaster site. For the exercise, supportive managers proved to be the most effective recruiters by sending much of their own staff. A citywide (and statewide) budget crisis with associated staffing cuts inhibited many sections from being able to part with any staff members. In the event of a real emergency, the Departmental Operations Center and citywide Emergency Operations Center would recruit staff through departmental managers. As a backup for the exercise, SFDPH Personnel Department was to be on-call to provide additional staff as needed.

In the end their assistance was not necessary. Final recruitment pushes resulted in 192 people working at the drill – this was shy of our desired goal but enough to begin the exercise. However the Security station was not staffed. Exercise organizers instead instructed all staff the morning of the drill that they would play a role in security and at directing patients and answering their questions.

F. Volunteer Patient Recruitment

Volunteer “patient” recruitment was another challenge. To test our assumptions about patient flow, the exercise needed at least 700 volunteer patients arriving within two hours of each other. A target goal of 1,500 patients was put on paper for recruitment purposes, with a minimum goal of 700 patients. We also hoped for patients that would represent the diversity of San Francisco. In that regard, marketing language was created that encouraged families, people with disabilities, children, the elderly, and people who did not speak English to attend. In a real emergency, each mass smallpox vaccination clinic site would include English and at least one other language. For the purposes of this drill, all languages were welcome.

Volunteer patients were not paid to participate. Parking was not reimbursed for patient participation. Since funds were limited, small thank you gifts (a first aid kit, a certificate of appreciation, leftover incentive gifts from other projects) and a raffle for larger prizes (gift certificates to department stores, i.e.) were used as incentives to attract volunteer patients.

A flyer for patient recruitment was created and translated to Spanish, Chinese, and Russian (see [Appendix, Attachment 8](#)). This flyer was then mailed to community based organizations, posted in the Civic Center area surrounding the Health Department, posted on the Department of Public Health Website, and shared in person at meetings, community forums and gatherings. On all marketing materials, the raffle and thank you gifts were emphasized. It was also communicated that people would be there two hours.

It was not made explicit on the recruitment flyer that this was a smallpox vaccination exercise, because we did not want to instill any unnecessary fear. If people asked, we would explain further, but for the general public, the drill was marketed as a “Public Health Emergency Drill.”

Recruitment of patient volunteers was less slow going than with recruiting staff, but many people worked tirelessly to help bring up the numbers. Aggressive outreach was a primary reason we were able to recruit close to the targeted number of patient volunteers. Three staff members devoted about 75% of their time solely to recruiting volunteers. In addition, three weeks prior to the event, a public relations firm with community organizing experience was hired to assist. Despite aggressive outreach efforts, it was necessary at the last moment to rely on paid City and County staff to fill the gaps in numbers. Two weeks prior to the event, the mayor sent out a letter to all City employees and this brought in an additional 400 patient volunteers.

A list of all marketing options used is included in the Appendix ([Attachment 12](#)), but some examples of how patients were recruited include:

- Creation of public service announcements for radio.
- Broad community canvassing with flyers/information.
- A press release that generated [print stories](#).
- Paid advertisements placed in neighborhood papers.
- Paid advertisements placed in monolingual, non-English papers.
- System-wide voice and email messages for SFDPH staff.
- A [mayoral letter](#) attached to a paycheck addressed to all San Francisco City and County employees encouraging participation in the drill and offering 2 hours of paid time with supervisory approval

- Use of smaller flyers on Muni public bus (transit) system.
- Working with local volunteer centers and volunteering websites.
- Posting information and registration materials (in English, Spanish, Chinese and Russian) on the SFDPH website.
- Use of an electronic newsletter to SFDPH staff encouraging their participation from the Health Officer.
- Use of television media (the day before the event) for last minute recruitment assistance.

When individuals were interested in registering as patient volunteers, they were asked to call a voice-mail box and leave their name, address, phone number and email address. They could also complete a patient registration sheet ([Attachment 9](#)) and fax it to a specific number. To avoid everyone arriving at once, people were asked to sign up for a specific arrival time, such as 10 am or 11 am or noon etc. If a time-slot filled up with over 320 people, volunteers were asked to arrive at another time.

G. Patient Education

Patient education consisted of the CDC-developed smallpox vaccine patient advice video *Decision Point for the Smallpox Vaccine Candidate* with an SFDPH-taped message spliced onto the front of the video (see Appendix for [transcript](#)), the smallpox Vaccine Information Statement and supplements (also CDC-developed), and a medical history and [consent form](#). All materials were color-coded by language and available in English, Spanish and Cantonese. English materials were in white, Spanish forms in goldenrod and Chinese materials in blue. All of the [patient education materials](#), as well as an [overall documents list](#), are included in the Appendix.

There were five education rooms for the showing of the video and each room had 50 chairs. Three rooms were dedicated to the English video, one room for Spanish and one room for Chinese. The idea was to show the video after all 50 chairs had been filled. For the Spanish and Chinese videos, however, it was not necessary to wait for all chairs to be filled before showing the video. There was also flexibility built in to the system such that if there needed to be two Chinese videos showing, this was possible, or if there needed to be four English videos showing, this was possible as well.

Patients were expected to read their informational materials as they were waiting for the video to begin. Patients were then expected to finish reading and complete the Medical History and Consent Form as they were going through the medical screening line (patient flow was improved by completing forms while standing) – all patients received pens and cardboard backings with their respective paperwork.

After viewing the video, patients' hands were stamped with a seal that read "Educated by DPH." This hand stamp ensured that patients would not be arriving for medical screening who had bypassed seeing the video.

Post-drill follow-up instructions for site checking were intentionally excluded from the materials offered to patients. The reasoning behind this was that there was no system in place to actually do site-checking post-drill, and SFPDPH did not want patients actually arriving for such activities (some volunteer patients did call after the exercise to obtain information on their smallpox “vaccination”).

In lieu of receiving follow-up instructions, patients received a [tip sheet](#) with general public health messages such as the location of all of the anonymous HIV testing sites in San Francisco, general immunization information, cardiovascular disease, and hand-washing tips. This is also found in the Appendix ([Attachment 18](#)).

III. Additional Decisions/Methodology

Further decisions had to be made regarding the overall policies of the exercise. Project leaders and the Steering Committee focused on the type of scenario that would guide the exercise, the level of marketing that would take place around the exercise, who could potentially attend as observers, how staff would be trained, how vaccinations would be administered and how the overall exercise would be evaluated.

A. Exercise Scenario

To help guide the drill, a [scenario](#) was created that enabled staff to implement full screening for contraindications. As a result of this scenario, it was also decided that approximately 3% of the patients who came to the drill would be considered contacts (this was considered to be a reasonable estimate replicating what would happen in reality with a scenario of this nature). It was also decided that there would be a total of 100 patients throughout the day who would have a fever or a rash, and less than 10 of those patients would be considered infectious.

June 17th Exercise Scenario

On Sunday, June 15th, 20 cases of probable smallpox were seen in Emergency Rooms throughout the country, with the largest number of cases presenting in the Washington, DC area. Additional reports of cases are coming in today (June 17th). At this time, it has been determined that all identified cases attended the symphony (~1000 attendees) at the Kennedy Center in Washington, DC on Sunday, June 8th. We expect additional cases from the initial presumed release to develop symptoms through June 25th, the end of the 7 – 17 day incubation period for smallpox. We expect additional cases to occur from contact with the initial cases.

There are currently 3 cases in the Bay Area, one of which is in SF.

Field investigation teams are doing potential case identification, contact tracing and ring vaccination for:

- Anyone who attended the event in Washington, DC on June 8th.
- Contacts of individuals who attended the event.

In addition, SFPDPH will be opening 40 mass vaccination clinics in San Francisco for SF residents.

B. Staff Training

1. Area Leader Training

In a real emergency, doors to receive patients would most likely remain closed until all staff felt as if they had been sufficiently trained. When one has only one day to train 192 staff members and conduct a drill, training time is markedly reduced. Anticipating this dilemma, a two-hour training was held the day before the event, June 16, 2003, for the people who, in advance, had been designated as Area Leaders. The training date of June 16 was chosen on purpose – holding the training as close to the drill as possible would improve the chance that most of the information would be retained.

At the Area Leader training (overview of training in Appendix, [Attachment 20](#)), an overview of the day and explanation of the site areas was given. Area Leaders also learned of their critical roles to:

- Train staff working in their areas
- Manage staff working in their areas (facilitate the taking of breaks and lunch)
- Oversee evaluation for each area, including initiating a “hot wash” debriefing session at the end of the day
- Ensure that staff complete Staff Feedback Forms and that staff edit Job Action Sheets
- Encourage comments on Staff Observation Sheets
- Answer questions for staff.
- Troubleshoot, solve problems on the spot.
- Initiate clean-up in area at end of day.
- Ensure that staff members were meeting requirements of the time motion study.

Area leaders, having some time to contemplate how to train their staff, came prepared the following morning. Materials were also provided for them on June 17 to assist with their training needs (i.e. a vaccination cheat sheet for vaccinators) (See Appendix, [Attachments 21 and 22](#)).

2. Training of all other Staff – Job Action Sheets

All other staff learned of their actual assignments and were trained in 45 minutes the next morning, June 17, by a brief orientation (with [Guidelines for the Day](#)), their Area Leaders and [Job Action Sheets](#). Every single position had a Job Action Sheet or job description. Each of these is included in the Appendix.

The Job Action Sheets would also be used in a real emergency to assist with reimbursement through the Federal Emergency Management Act or FEMA. In particular, the “time” column is necessary in a real emergency, but was not necessarily relevant for the mass smallpox vaccination drill.

C. Communication Systems

All staff who worked at the event wore blue pinnies (an inexpensive type of vest, often worn in intramural sports). Area Leaders wore red pinnies. Exercise controllers wore white vests. The primary means of communication between one area and another was via runners. In a real emergency, it was anticipated that we would not have access to the hundreds of radios needed for 40 different sites, so we wanted to test our ability to communicate with runners.

Some radios were available at the drill, for exercise controllers (five controllers participated). These were used to access the on-site ambulance crew and first aid station in case of a real medical emergency, and to access the Departmental Operations Center to make unanticipated material and personnel requests.

D. Vaccination

No real smallpox vaccinations were given at the drill, and no needles or sharps were present. There were 15 vaccination stations, each staffed by two people (following CDC recommendations to alleviate repetitive motion stress and fatigue) who took turns vaccinating and dressing vaccination sites. "Vaccination" was by dipping a small plastic stirring stick into a vial of sterile water. Proper protocols for initial vs. revaccination (3 jabs vs. 15 jabs) were then followed. Nurses were asked to document the vaccines given by placing a lot number sticker on the Medical History and Consent Form (this would replicate the "PVN" number that comes with the Strategic National Stockpile vaccine), and initialing and dating the form.

No vaccine reconstitution took place on site, but the pharmacy area would have been responsible for such action. The pharmacy area was also responsible for packaging the stirring sticks in batches of 100 and attaching pre-printed lot number labels with the stirring sticks and vaccine vials (the idea was to replicate what would be arriving from the Strategic National Stockpile in the event of a real emergency).

There were a number of checks and balances built into the system to ensure that those arriving for vaccination were, indeed cleared for vaccination. These included the following:

- Hand Stamps ensuring that patients had watched the video
- Screening Line Monitors who checked hand stamps
- Medical Screeners who signed off on Medical History and Consent Forms saying that patients were cleared for vaccination (if patients had a contraindication but wanted to be vaccinated anyway, a bright green sticker was placed on the Medical History and Consent form that read "+CI – Cleared for Vaccination")
- Patient signatures on Medical History and Consent Forms
- Vaccination Line Monitors who checked Medical History and Consent Forms for two signatures.

By creating all of these checks, only the patients who were truly clear for vaccination would arrive for vaccination. The vaccination nurses could then focus solely on vaccination rather than screening.

E. Event Marketing

The best reason to use the media prior to the event was to assist with patient recruitment. To the media, however, “*patients needed to participate in a drill*” is not a story with a good hook. Timing was also an issue – to air a television story too early would result in people forgetting about the event. After many discussions in the Steering Committee, it was decided to be available for press the day before the event - invite them to the training for the Area Leaders, invite them to tape some site set-up images, and have the story be that the Health Department was preparing for a large disaster drill to take place the next day.

On the day of the event, three activities took place that helped disseminate information about the drill and facilitate coverage.

- There was an educational presentation made to other county health departments and health agencies. Continuing education units were offered for attending this lecture and the lecture was marketed in advance via electronic distribution lists and statewide newsletters. The Director of the Community Health Epidemiology and Disease Control (CHEDC) Section gave the lecture.
- A press conference was held during the event. Press was directed to the mezzanine level, above the auditorium, where a podium and chairs were set up. This also enabled press to get some camera shots from above the main floor where the exercise was taking place.
- A briefing for VIPs was held that same day, in the same location as the press conference. Attendees included representatives from Congress and the State legislature, County supervisors, members of the Health Commission and local officials involved with community government. The Mayor of San Francisco had made an appearance earlier that day and was “impressed” by the high degree of organization.

The overall result was that the drill was well received by both the electronic and print media. All major networks from San Francisco (NBC, CBS, ABC, Independent Channel 4 and Fox TV) ran prime time stories during their early evening broadcasts. Spanish speaking Telemundo and Chinese Television also covered the event for their audiences that reach well beyond the Bay Area. One station in particular, (Independent) KRON Channel 4, dispatched a film crew early in the morning and a second one in the early afternoon to film the wrap up.

F. Event Observers

The Steering Committee made a decision that there would be no observers at the exercise –if people wanted to observe, they would have to register as patients. This no-observer policy made it easy to be objective when people asked if they could come and watch. It also increased the number of patients participating in the exercise.

G. Evaluation

It has already been stated that one of the primary evaluation tools was the Time Motion Study. To conduct such a study, almost every staff member present had a staff code, and the Area to which they were assigned also had codes. Each patient volunteer had a data collection sheet and every interaction between a staff member and a patient was documented by writing the time on the data collection sheet. Waiting time was assessed by measuring the amount of time between patient interactions.

Other evaluation tools included a Patient Evaluation Sheet, a Staff Feedback Sheet, and on-site debriefings by area as well as an overall debriefing.

Patient Evaluation Form – This was completed by patients to gain feedback regarding understandability of information and site organization from a patient perspective. Completion of this form also entered them into the raffle for larger prizes at the June 17th Event. Their responses were entered into an Access database created specifically for the drill on-site at the June 17th event. To perform the data entry, 10 laptop computers with (connected to regular size keyboards) were set up on site.

Staff Feedback Sheet – When staff checked in, they were given a clipboard with a number of papers and a pen. One of the papers was the Staff Feedback Sheet, which they were asked to complete for qualitative responses about communication on-site, supplies, and job training. Staff were also given observation sheets (in case there was not enough space on the feedback sheet), but their completion was not mandatory.

Debriefing Sessions – At the end of the exercise, each Area conducted a debriefing session. Responses were recorded on flip-charts and employees answered questions about what worked in their area and what did not work. The final activity of the day was to gather all staff in one room and have an overall debriefing about what did and did not work throughout the day. Again, these responses were recorded. Both of these debriefing sessions were called “Hot Washes,” as is the lingo for military debriefing sessions in disaster situations.

All recorded information, from the patient evaluation forms, staff feedback sheets and the debriefing sessions, was compiled. The major findings are listed below in the Results/Outcomes section and the Lessons Learned section.

IV. Challenges

There were a number of challenges that applied to the planning and the actual “day-of” activities for the mass clinic drill. Many of these challenges would also apply in a real emergency, but some would not. For example, if a large scale release of smallpox virus truly had occurred in a community, we did not think that either staff recruitment or patient recruitment would have been an issue. By having public figureheads on television directing people where to go, people would arrive in droves (especially staff, since they would be vaccinated first).

The following is a table of major challenges we experienced, and whether or not we think they would have applied in a true emergency or whether they would simply be challenges for anyone conducting future exercises.

Challenge for June 17 th Exercise	Would it apply in a real emergency?
1) The short planning timeline	Yes, it would be much shorter in a true emergency. However, additional local, state and federal resources would be available to support our efforts.
2) Sufficient Staff Recruitment	Depending on the communication medium (television and radio, i.e.) and the clarity of the broadcast message, the biggest challenge may be setting up of a large scale registration system. In a real emergency, all SFDPH staff would be required to report to the disaster site, and the Emergency Operations Center would also assist with staff recruitment.
3) Sufficient Patient Recruitment	In a real emergency, patient recruitment may be a non-issue. There would be significant challenges, however, in reaching/vaccinating the homebound, people with disabilities (hearing impaired, developmentally disabled e.g.), the homeless, or others with special needs. Again, clarity of broadcast messages would be of utmost importance to direct patients where to go.
4) Estimating how many supplies would be needed before having an idea as to how many patients would be attending.	It would be a definite challenge to stock multiple sites with sufficient supplies in a timely manner.
5) Purchasing needed items in time of the event within the confines of the City and County purchasing system.	Many of the purchasing constraints would be lifted in the case of a true emergency.
6) Setting up contracts in short time frames with the Public Relations firm and the Consulting for the time-motion study.	This would not apply in a true emergency.
7) Documenting times for the Time Motion Study	No. The time motion study was a valuable tool for collecting data, but would most likely not be used in a real emergency. During the busiest time of the day (between 10am and noon) for the drill, the added responsibility of documenting time probably slightly decreased the efficiency of patient flow. SFDPH staff also had the burden of some of the watches that were supposed to be synchronized not telling the correct time, so they would have to consult with others to ensure they were documenting the right time. In a true emergency, these added responsibilities would not exist and staff could focus entirely on moving patients through.

Challenge for June 17th Exercise	Would it apply in a real emergency?
8) Determining the proper educational video to show patients.	Yes. CDC has developed a post-event smallpox vaccine education video, but it is outdated (focusing a great deal on the Investigational New Drug status), it is too long (> 18 minutes), and it is alarming (stating that indeed an act of terrorism has taken place in one's community). Finding the proper video – to simply speak about the benefits and risks of smallpox vaccine, go over contraindications and site care instructions, and translating the video to the languages that are needed (with closed captions for the hearing impaired), would all be major challenges that would apply in a true emergency.
9) Communicating properly with developmentally disabled patients	Yes. The overall level of literacy for the paperwork and educational materials, (the VISs, the Medical History and Consent form, and even the video) were all too advanced for a mass audience . More developmentally appropriate materials need to be created if they are to be truly understood by a mass audience. If this is not feasible, changes would have to be made in processes (with additional, specialized staff), to accommodate many special needs of the developmentally disabled.
10) Translating materials into different languages in a timely manner	Yes. In San Francisco there are over 40 languages spoken. Getting the video translated and with subtitles in a timely manner will be a tremendous challenge for a real emergency, as well as double checking printed paperwork for proper translations.

V. Results/Outcomes

A. Time Motion Study Data

This section contains excerpts from the full [Time Motion Study report](#), which is available in the Appendix.

Data entry forms were completed for 1,325 patients who came through the exercise and 136 staff members with direct patient contact participated in the time motion study.

- 89% of the patients seen were English speakers and spent an average of 61 minutes in the exercise: 21 minutes were spent receiving services, the remainder (40 minutes) was spent waiting.
- 5.4% of the patients were Chinese-speaking and spent an average of 76 minutes in the exercise, with 22 minutes receiving services.
- 3.1% of patients were Spanish-speaking and spent an average of 65 minutes in the exercise with 27 minutes receiving services.
- On average, 35% of the time spent receiving services was spent watching the video.

The following tables show the average number of minutes patients spent in session by language, and the time receiving services for the primary language groups by clinic stop.

Time in Session and Receiving Services by Primary Language

(Numbers from JBA report have been rounded to nearest minute and percent.)

Language	# of patients	Average Minutes in Session	Range of Minutes in Session	Average Minutes Receiving Services	% of Time Receiving Services
ASL	8	126	123-129	52	41
Chinese	72	76	33-130	22	29
English	1,184	61	1-190	21	34
Filipino	1	78	78	25	31
Russian	1	53	53	5	9
Spanish	41	66	24-121	27	41
Tagalog	6	53	33-83	21	40
Vietnamese	12	107	43-118	54	50
Total	1,325	62	1-190	22	34

Average Minutes Receiving Service by Stop

Stop	All Patients	English	Chinese	Spanish
Triage	1	1	2	1
Video	16	16	17	19
Screening Line	1	1	1	1
Medical Screening	3	3	3	4
Contraindications Screening	4	4	2	5
Vaccination Line	1	1	1	1
Vaccination	1	1	1	3
Site Dressing	1	1	1	2

The longest stop in the exercise was the video, with patients spending an average of 16.3 minutes in the video room. The Medical Screening and Contraindications stops were the next longest (2.7 minutes and 3.6 minutes respectively). Vaccination and site dressing was quicker than had been anticipated.

Patient Waiting Time

Clinic Stops	# of Events (Patients Served)	Mean Waiting Time
Triage	1,312	3
Contacts	79	30
Fever/Rash	53	22
Video	1,225	9
Screening Line	1,199	14
Medical Screening	931	3
Contraindications Screening	431	4
Vaccination Line	698	2
Vaccination	711	4
Site Dressing	694	0
First Aid	3	8
Mental Health	16	8

The largest bottleneck at the exercise for the majority of clients served was the line waiting to speak with a medical screener (14.1 minutes waiting time). This was heavily influenced by the groups of people who would arrive from watching the video, and the fact that in the middle of the day, many of the medical screeners took breaks for lunch.

Staff Utilization

Clinic Stop	# of Staff	Available Staff Time (minutes)	Patient Contact Time (minutes)	% Time in Patient Contact
Triage	15	3,040	1,176	39
Contacts	9	1,574	735	47
Fever/Rash	4	761	202	27
Screening Line	7	1,909	727	38
Medical Screening	20	5,323	2,480	47
Contraindications Screening	13	3,394	1,500	44
Vaccination Line	4	1,048	372	35
Vaccination	26	6,517	850	13
Site Dressing	26	6,530	535	8
First Aid	2	612	45	7
Mental Health	3	926	94	10

Note: The Video Room stop is not included in the table above because staff was not serving individual patients, but groups, and staff was not in actual contact with patients.

The personnel whose time was best utilized (meaning the highest percentage of their available time was spent serving clients) were the medical screeners and contraindication counselors. These were essentially the same job function and over 45% of their available time was spent serving patients. The most poorly utilized staff were the vaccinators and site dressers (13% and 8% of their time with direct patient contact).

These data clearly demonstrate that there were too many vaccinators. At least five vaccination stations (10 staff people) could easily have been closed and these clinical staff could have been redirected to perform as medical screeners.

This staff utilization data, coupled with the information about the average number of minutes per stop, gives an impression about the number of patients who can subsequently be seen at a specific stop. For example, there were a total of 5,323 staff minutes available at Medical Screening. Assuming that 75% of the available time (3,992 minutes) was utilized to see patients for an average of 2.7 minutes per patient, this stop had the capacity to see 1,490 patients.

Time Motion Study Recommendations

The overall recommendations that resulted from the Time Motion Study echo many of the recommendations that SFDPH staff concluded after the exercise (and are elaborated upon in subsequent sections). In summary they include:

- Reduce the number of vaccinators/site dressers and increase the number of medical screeners.
- Add more staff to the entry area to answer questions and direct traffic.
- Utilize clear, effective signage with directional arrows (suggested colored tape on the floor).
- Have runners wear a different color pinnie or be easily identified as a runner for when the area is extremely crowded or congested.
- Conduct more training for triage staff. Ensure that in addition to their sorting duties, they are also able to answer questions about all of the activities that will take place inside.
- Use snaking lines wherever possible.
- Use separate lines for different languages or people with special needs.
- Create a communication system between the video rooms and screening line that notifies when a large group is coming into the line, especially a non-English speaking group. Ensure that there is then proper non-English speaking staff to assist those patients.

An underlying goal of the drill was to understand the logistical considerations needed to move approximately 312 patients through the exercise per hour. In order to accomplish that goal during a 5 hour drill, at least 1,560 patients would need to present for service. We did not have that many patients attend and the CDC-developed software is not able to focus solely on our busiest hours (between 10 am and noon) to determine just how many patients came through the exercise. We do know, however, that the average patient spent just over 60 minutes in the drill. This exceeded our expectation of 1.5 – 2 hours per patient.

In a real emergency, more time would be devoted to explaining patient follow-up and site checks. However, using our site model, we believe that it is very doable to move over three hundred people through each hour.

B. The Patient Experience

Approximately 1,350 patients came through the exercise.

Self-Reported information from the patient evaluation forms (1,271 forms collected) revealed the following:

- The age range of patients was 1-93 years, including 65 children less than age 18.
- The median age of all patients was 42.
- 63% of patients completed the exercise in 90 minutes or less.
- 12% of patients did not speak English at home. Languages spoken at home included:

Language Spoken at home	%
Cantonese	29%
Other Chinese (unspecified)	28%
Spanish	24%
Tagalog	8%
American Sign Language	4%
Vietnamese	2%
Russian	2%
Korean	1%
French	1%
Portuguese	1%
Mandarin	1%

The following responses were compiled from the Patient Evaluation Forms that were completed and turned in.

Question from Patient Evaluation Form	% of All Patients who Agreed	% of all Non-English Monolingual Patients who Agreed
Medical History and Consent Form was easily understandable	63%	57%
Exercise was well organized and orderly	94%	87%
DPH Staff was confident and knowledgeable	90%	77%
Patient was able to understand all written information given	93%	81%
Patient was given clear direction on movement through exercise	85%	79%
Patient was informed of right to decide against vaccination	87%	78%
Video was clear on risks and benefits of vaccination	86%	80%
Patient was given clear instruction on how to take care of vaccination site	76%	70%

- In the interest of moving patients through quickly, it was a conscious decision of event organizers to limit the number of chairs that were available on the floor, but this ultimately lead

to some patients complaining about not getting to sit enough. This would probably not apply in a real emergency.

- Many patients commented on how real the experience felt. In fact, for three patients in particular, the experience was so real that they later called the health department to say they were having a “reaction” to being “vaccinated.” These patients required special conversations to reiterate that the entire experience was pretend, and that they had only had water placed on their arm, but it was interesting to event organizers to learn about the power of the mind and how real it can make things appear. This would be greatly exacerbated in a true emergency.
- Some patients made up roles for themselves to play, even though they were not instructed to do so. This was a surprising but (after speaking with other disaster organizers) not uncommon occurrence. Disaster drill planners must be aware that some members of the public take it upon themselves to act out more than is required of them.
- Finally, our patient evaluation form did not ask how they had heard about the drill, thus it is not possible to determine the most effective recruitment methodologies.

C. The Staff Experience

- 192 Employees worked an 8-hour shift at the drill.
- 155 staff feedback forms were received.
- 82% of staff agreed that the on-site training was satisfactory.
- 92% of staff agreed that the job action information they received was easy to understand.
- 96% of staff agreed that the floor plan of the site was easy to understand.
- 94% of staff agreed that the supervision of their work was satisfactory.
- 88% of staff agreed that the supplies provided to them were adequate.
- 82% of staff agreed that the message/communication system at the drill was effective.

A very high percentage of staff commented that the training they had received was adequate, as was the information on their Job Action Sheets. Upon examination of some of the practices that took place at the drill, however, there were a number of training issues that would need to be rectified in the case of a true emergency.

For example, there were some patients who were not properly triaged, there were too many patients who were sent to the Contacts Area, and there were patients who ended up in the vaccination area who were not actually cleared for vaccination. More time spent on training could have also prepared staff to better answer patient questions about the location of the next area they should visit, and the activity that would take place there. Staff needed more of a general understanding about the functions that were taking place in each of the Areas. Staff (especially the medical screeners and the vaccinators) also could have benefited from watching the smallpox vaccine educational video. On the morning of the drill, however, there simply was not sufficient time to go into all of these specifics.

82% of staff agreed that the system of using runners for communication at the drill was effective, but there were also many suggestions to have runners in different colored pinnies for future drills.

Overall, staff and Area Leaders did a phenomenal job of solving problems on the spot, and there was very positive feedback about the general feeling of camaraderie amongst the diverse staff working at the exercise.

D. Vaccination Outcomes

- 1,292 patients turned in completed Medical History and Consent Forms. (1,199 English forms, 62 Chinese and 31 Spanish forms.)
- 703 patients (54%) received vaccinations (647 English (54%), 37 Chinese (60%), and 19 (61%) Spanish).

It is difficult to track the 46% of patients who were not vaccinated and know their reasons for declining vaccination because:

- Much of the medical information could have been fictitious.
- Many of the forms were not properly completed and it is unclear if they had true contraindications or were just not interested in the vaccine.
- Some of the nurses did not properly document as to whether or not a vaccination had indeed been given.

These two latter points were most likely a function of insufficient staff training and will be addressed in the section regarding learned lessons.

E. Paperwork and Data Entry

CDC developed the majority of the patient paperwork that was used for the drill. Many comments were received that it was too difficult for patients to interpret. The Medical History and Consent Form, in particular, though it had been modified by SFDPH to appear clearer, was something that needed to be explained question by question to patients, and the VISs and supplements were too long to fully comprehend. The video also lacked closed captions. We did have a number of patients come through the exercise (n=9) who were hearing impaired and developmentally disabled. Communicating with them about contraindications was a time-consuming process. The Contacts Area paperwork from CDC was also inadequate and cumbersome and not applicable for use in a mass clinic situation.

The data entry that was performed on-site would not be done in a true emergency because it focused on patient evaluation instead of medical history. In a real clinic situation, if data entry were to take place on site, it would be from the Medical History and Consent Forms, to track who was and was not vaccinated. A user-friendly database would have to be created as the secure data network of CDC, the Pre-Event Vaccination System, is not designed to accommodate post-event data entry. If data entry were not taking place (on the medical history and consent forms), we would recommend utilizing these staff in other areas (i.e. Security).

VI. Lessons Learned / Recommendations

Although the entire experience was informative and educational, there are some major lessons that we learned that should be applied to future drills as well as real emergency situations.

Lesson Learned	Recommendations
<p>There was a need for greater security. DPH staff assigned to specific areas had multiple job functions for that specific area. Asking them to act as security guards in addition was overwhelming. More people needed to be designated specifically to watch patients and ensure that they were not loitering or in need of assistance.</p>	<p>For each Area, designate at least two additional people to act as Security Guards or Security Monitors. In this regard, we did not have enough staff working. The overall number of staff people present should have been 224. Consequently, to fully staff 40 simultaneous sites throughout the City for one 8-hour shift. For two shifts, this equates to 17,920 people needed per day. Greater security should also be posted at the entrance to the site to answer questions regarding the activities that will take place inside and act to sustain a level of calm at the site.</p>
<p>Designate more time for staff training. For this exercise, Job Action Sheets were used with clear job descriptions, but most staff members received 45 minutes of training and for many this was not sufficient. Many issues were identified throughout the exercise (in Triage, Video Education, Vaccination, and the Contacts areas especially) that could have been prevented with more thorough training.</p>	<p>Do not open doors until all staff are adequately trained. Ensure that staff know the specifics of the Areas that precede and follow their assigned work Areas. Develop a training curriculum that entails role playing and market the curriculum in advance to interested staff. Ensure that all staff have adequate time to read and ask questions about their job action sheets.</p>
<p>Clear, large and creative signage is of utmost importance. When large rooms are full of people, pointing to a sign for the next station is only minimally effective. Larger signs in more visible display positions were necessary. More directional aids on the floor would have helped as well.</p>	<p>Use creative means such as colored balloons or poles to identify line entrances or different stations. It was recommended that, to help with visibility, colored paddles be given to medical screeners to hold up when they were ready to interface with their next client. Also, to better direct patients, it was recommended that colored tape be placed on the floor. This had actually been considered as too expensive an option for the drill (because of the size of Bill Graham Auditorium, and their own codes about what could be stuck to the floor), but in a real emergency it would be worth the investment and should be seriously considered.</p>
<p>There was need for increased mental health staff presence – and staff with experience communicating with developmentally disabled.</p>	<p>More mental health counselors would be necessary in a true emergency than were used for the drill. The level of fear and anxiety would be much higher in a post-event situation. It is also recommended that Mental Health be stationed near or next to First Aid in that some patients will need the services of both areas.</p>

Lesson Learned	Recommendations
<p>The Contacts Area staff model was not appropriate to deal with all of the issues they encountered. There was a need for at least one person who could perform triage, a separate medical screener and a separate vaccinator.</p>	<p>For the drill, only one nurse was responsible for both educating and vaccinating those patients who were exposed or were contacts of exposures. Once in the contacts area, there was no triage method and the educator/vaccinator would have to spend a large amount of time with patients. Depending on the scenario, and in addition to the disease control investigation staff, the Contacts Area should include at least one person dedicated to each of triage (to separate exposures from contacts of exposures), medical screening and vaccination.</p>
<p>Curtains do not produce sufficient sound barriers for showing videos and video areas were potentially too large.</p>	<p>The English videos were shown to groups of 50. If possible, have more video rooms that accommodate fewer people and ensure that the videos are shown at staggered times. This will alleviate a large bolus of people entering the screening line at once and create more of a constant trickle of patients to the screening line instead. Also if possible, show the videos in rooms with actual walls, or space showings far apart so that the sound from one video does not interfere with the sound from another video.</p>
<p>Work out a plan for infectious waste clean-up and transport in advance.</p>	<p>Although infectious waste bags were purchased for our drill, they were not ultimately used because of the need for trained/certified staff to handle their disposal. In a true emergency finding sufficient staff who are properly certified would be a tremendous challenge so it is best to have a plan on paper in advance.</p>
<p>There was no need to separate the patients into “Hard” or “Easy” categories. This was done by the medical screening line monitors, to assist with patient flow. Those with no contraindications were sent to easy tables and those with contraindications were sent to hard tables. In the end this was not necessary and impeded patient flow. Nor was it necessary to have two separate screening areas – one for more difficult contraindications or patient questions. This separation of areas also impeded patient flow and efficiency.</p>	<p>Have all medical screeners sufficiently trained to accommodate both challenging and straightforward cases. Do not delineate between hard and easy, simply send patients to the next available station. It is easier on the line monitors and facilitates better patient flow.</p>
<p>Needed separate lines for different languages and the disabled. Disabled patients were walked to the front of the line during our drill, but those who spoke Spanish or Chinese had to sometimes wait longer than English speakers for an open screener. In those cases, English speakers were passing them in line.</p>	<p>Create a separate line for non-English speakers and filter patients with colored paperwork into that line. Create third line for those in wheelchairs or who have trouble walking/standing for faster service.</p>
<p>Needed information regarding self-protection if not vaccinated.</p>	<p>In a true emergency, it would be very important to include information about how to care for one’s self if not vaccinated. This was a component that was missing for our drill.</p>

Lesson Learned	Recommendations
Buy-in from top management is of paramount importance.	If conducting a drill and using staff as patients or staff, supportive buy-in must be sought and secured from top-management. It is important to also update top management as to progress made so they remain supportive of the project.
Needed more developmentally appropriate educational materials.	Spend time in advance modifying paperwork and educational aids to ensure that they have broad understanding.
There is no such thing is having too many bilingual staff.	The needs for bilingual staff are so great (they are needed in almost every area) that bilingual recruitment cannot be stressed enough. This needs to be heavily incorporated into all recruitment plans.
It worked well to have the press and VIP briefings removed from the exercise.	The press conference and VIP briefings were held on the second floor of the building, overlooking the exercise as it was unfolding. This was very helpful at not distracting staff who were busy seeing clients or trying to direct flow.
Have a system in place to ensure that medical license numbers are checked – or ensure that only licensed physicians/nurses are working.	In a true emergency, this would be very difficult to sort out in advance, but is necessary to ensure quality assurance and liability protection.
Ensure that a follow-up system for site checking and post-vaccination questions is in place before vaccinating any patients.	This was not done for the drill, but would absolutely be necessary in a real emergency.

VII. Conclusion

All around, this was a tremendously beneficial experience. The event brought staff members together from all over the health department created a high level of camaraderie among City/County workers. It served as a hands-on model by which we could clarify logistical issues, and it exposed many people to the type of work (and levels of exhaustion) that would exist in a real emergency.

By and large, the site layout model worked. The large, open space of the auditorium in particular was conducive to moving people through quickly and preventing any closed-in or fearful feelings. With the recommended modifications, we will continue to plan for the same general layout at other locations throughout the City. In addition, we will create staff registration systems, easy-to-use training curricula and protocols for clinical follow-up of vaccination takes and site care.

We will also continue to share our experiences and encourage other organizations to plan similar drills. The hands-on experience not only had a positive impact on program planning, it also had a positive impact on the staff and patients who participated, and helped to educate many people in the community about communicable disease.