Successful Use of Volunteers to Conduct School-located Mass Influenza Vaccination Clinics

abstract

OBJECTIVE: To determine the feasibility of using volunteers to assist in school-located mass vaccination clinics for influenza.

METHODS: A set of elementary school-based mass vaccination clinics was implemented in Carroll County, Maryland by the local health department in the 2005–2006 school year. In addition to using health department personnel, fiscal restraints necessitated using medical volunteers and lay volunteers to assist health professionals. The medical volunteers included physicians, nurses, and pharmacists, and were responsible for administering intranasal vaccine (live, attenuated influenza vaccine [LAIV]). We assessed the performance, as measured by the number of vaccinations administered, and effort expended by these volunteers.

RESULTS: A total of 5319 (44%) of the 12,090 elementary school children in the county received LAIV. Of the estimated 3547 (66%) children eligible and consenting to receive a second dose, 3124 (88%) received it. In total, 8806 doses of LAIV were administered. Health department nurses worked 42 person-days and were assisted by medical and allied health professionals volunteering 87 person-days without compensation, totaling 581 person-hours spent in this effort.

CONCLUSIONS: A mass school-located influenza vaccination program using medical and lay volunteers guided by health department nurses is feasible. Several issues were identified to improve future clinics and help make the program sustainable. Pediatrics 2012;129:S88–S95

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KEY WORDS: influenza vaccination, mass vaccination, immunization programs, school-age population, school health services

ABBREVIATIONS

ACIP—Advisory Committee on Immunization Practices
CCHD—Carroll County Health Department
CCPS—Carroll County Public School System
LAIV—live attenuated influenza vaccine
SLV—school-located vaccination
TIV—trivalent inactivated vaccine
UMMC—University of Maryland Medical Center
UMSM—University of Maryland School of Medicine

The 6 authors made substantive intellectual contributions to this published study and met the following criteria: (1) made substantial contributions to the conception and design, acquisition of data, or analysis and interpretation of data; (2) drafted the article or revised it critically for important intellectual content; and (3) approved its final version to be published.

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Children play a major role in the transmission of influenza.1–6 The Advisory Committee on Immunization Practices (ACIP) has progressively updated recommendations for influenza vaccination, which now include all children aged 6 months through 18 years.7 Prevention of influenza infection among children by vaccination has the potential to provide herd immunity and may prevent the spread of influenza to their families and communities.8–15 However, it may not be practical to immunize very large numbers of children in primary care offices, because this could involve substantial patient waiting times and greatly increased occupancy of examination rooms.16 School-located influenza vaccine administration offers several advantages, including efficiency, convenience to parents, and the potential for higher vaccination rates. School nursing clinics have been used to administer many of the other ACIP-recommended vaccines, although mass clinics for any single vaccine have not routinely been held for the past decade.17–21 Live attenuated influenza vaccine (LAIV) is approved for use in the prevention of influenza in healthy individuals aged 2 to 49 years. Parenteral trivalent inactivated vaccine (TIV) is licensed for use in all individuals aged 6 months and older. LAIV and TIV could both be used in school-located immunization programs. We recently demonstrated the feasibility and effectiveness of elementary school-located administration of LAIV in a pilot program and subsequent multicenter study.10,14 The intervention group that received the vaccine reported large and significant reductions in influenza-like illness-related medical visits, over-the-counter and herbal medication purchases, and prescription purchases among family members of children who attended the targeted schools in comparison with families of children who attended control schools in which influenza vaccine was not offered. Both school and work absenteeism were reduced by more than one-third in families of the intervention group, compared with the control group.

Based on the success of these vaccination programs, the Carroll County Public School System (CCPS) approached the Carroll County Health Department (CCHD), and the faculty of the University of Maryland School of Medicine (UMSM) to offer LAIV in school-located vaccination (SLV) clinics in all 21 public elementary schools in the county during the 2005–2006 school year. This report describes the countywide SLV initiative in detail to inform other communities considering similar large-scale SLV programs or planning a mass vaccination intervention in response to an influenza pandemic. In particular, we describe the value of volunteer lay and medical staff in this effort.

METHODS

This report is a retrospective summary of a public health program conducted during fall 2005. The University of Maryland (Baltimore) Institutional Review Board approved this retrospective examination and subsequent data collection.

Vaccinees

The program was conducted for healthy children in grades K to 5 in any of the 21 public elementary schools in the Carroll County Public School District. Only students who were eligible to receive LAIV could participate in this public health initiative. LAIV was licensed for healthy children >5 years of age at that time.

Organizational Structure (see Table 1)

Planning Committee

The program was conceived for Carroll County children by senior administrators from the CCPS (S.G. and M.H.) and was developed by a planning committee with representatives from CCPS, CCHD, UMSM, the Maryland Department of Health and Mental Hygiene, and MedImmune, Inc. (Gaithersburg, Maryland). A planning committee was formed and was developed by a planning committee with representatives from CCPS, CCHD, UMSM, the Maryland Department of Health and Mental Hygiene, and MedImmune, Inc. (Gaithersburg, Maryland). The program was conducted for healthy children in grades K to 5 in any of the 21 public elementary schools in the Carroll County Public School District. Only students who were eligible to receive LAIV could participate in this public health initiative. LAIV was licensed for healthy children >5 years of age at that time.

TABLE 1 Organization Chart for School-Located Influenza Vaccination Program in Carroll County, Maryland

<table>
<thead>
<tr>
<th>Group</th>
<th>Task</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning committee</td>
<td>Design effort</td>
<td>Administrative representatives from CCPS, CCHD, UMSM</td>
</tr>
<tr>
<td>Enrolers of vaccinees</td>
<td>Develop protocols information packets, and consent forms</td>
<td>Individual school teachers, administrators, and nurses</td>
</tr>
<tr>
<td>Trainers</td>
<td>Distribute, collect, and organize parent information packets, consent forms, and FERPA forms</td>
<td>Authors G.C. and J.K. from the UMSM</td>
</tr>
<tr>
<td>Medical volunteers</td>
<td>Train medical volunteers on vaccine</td>
<td>Nurses, physicians, pharmacists from various sources including CCHD, Carroll County Hospital, UMMC, and State of Maryland Volunteer Corps</td>
</tr>
<tr>
<td>Individual schools</td>
<td>Train volunteers on how to properly identify vaccinees</td>
<td>Mostly parent volunteers, school nurses, or school administrative staff</td>
</tr>
</tbody>
</table>

FERPA, Family Educational Rights and Privacy Act; CCPS, Carroll County (Maryland) Public Schools; CCHD, Carroll County (Maryland) Health Department; UMMC, University of Maryland Medical Center; UMSM, University of Maryland School of Medicine.
MD), which manufactures LAIV (FluMist). The group held 2 half-day planning meetings during the late summer of 2005 before the new school year began. The goal of the program was to vaccinate all healthy public elementary schoolchildren at their schools during school hours before the anticipated onset of the 2005–2006 influenza season. Figure 1 shows a timeline of the development and implementation of the program. A physician from the CCHD (E.R.) was responsible for ordering LAIV for this program.

Volunteers

Because of budgetary constraints, the program was conducted by the use of predominantly medical and lay volunteers. In addition, some paid CCHD nurses had some of their duties reassigned to assist in the immunization effort, whereas others volunteered their time. The planning committee estimated that between 2 and 4 medical volunteers would be needed per school on each vaccination day. Personnel licensed to administer vaccines were recruited from the CCHD; the local Carroll Hospital Center; the University of Maryland, Baltimore Schools of Nursing, Medicine, and Pharmacy; University of Maryland Medical Center (UMMC) in Baltimore; and the Maryland Professional Volunteer Corps. The latter is a statewide registry of volunteer nurses and physicians recruited and coordinated by the Maryland Department of Health and Mental Hygiene to respond to medical or natural disasters. Volunteers were recruited primarily via personal communication by members of the planning committee within the medical facilities described above, and by invitations posted on the Maryland State Board of Nursing Web site (http://www.mbon.org). All medical volunteers were licensed at the time in Maryland. Local and state health department medical staff had malpractice insurance for this activity provided by the Maryland Tort Claims Act, and employers providing medical volunteers had temporary malpractice coverage from UMMC, Carroll Hospital Center, and University of Maryland, Baltimore for the duration of this program. For the purposes of data collection, the time spent by each volunteer for the effort (including the morning training, transportation, and vaccinating until the end of the school-day) was estimated at 8 hours or 1 person-day.

Each public elementary school provided 2 to 3 parents or lay staff volunteers to assist the medical volunteers on vaccination days. The school nurses collected the signed vaccine consent forms in advance and organized them by class, but, to prevent interference with their regular professional activities in the schools, they did not participate in the administration of vaccine.

Instruments and Procedure

Dissemination of Information and Consent Forms

Fact sheets about LAIV and vaccine consent forms were distributed to parents in children’s elementary school “take-home folders” by the administrative staff of each school in mid-September 2005. A Family Educational Rights and Privacy Act consent form was included. A signed consent form indicated to volunteers that the student was planning to participate.

During September and October, the full-time nurse at each school reviewed the child’s emergency medical information on file for any medical information that would exclude the child from receiving LAIV. Contraindications included allergy to eggs and any chronic medical conditions, including asthma. The parental consent form did ask whether the child had ever received an influenza vaccine, which was used by the school nurse to determine the number of previously unvaccinated children younger than 9 years of age who would

![FIGURE 1](https://example.com/figure1.png)

**FIGURE 1**

School-located mass influenza vaccination program timeline. LAIV, live attenuated influenza vaccine.
need a second dose of LAIV according to ACIP recommendations.7

Vaccine Procurement
The sole manufacturer of the vaccine donated all LAIV used, without regard to health insurance coverage; vaccination was thus offered to all consenting children at no charge. The quantity of vaccine shipped was based on the number of signed consent forms provided by the school nurses. Frozen vaccine in individual spray applicators was delivered on dry ice in packages containing up to 400 doses to a centrally located community senior center in Carroll County the day before each vaccination day. After each day’s clinic was complete, unused frozen vaccine was returned to CCHD or a local hospital and stored there in freezers at —20°C. Note, since 2007, LAIV has been formulated as a refrigerated product which at no time requires freezing.

Volunteer Training
All medical personnel had an MD, a DO, or a RN degree. Pharmacists and volunteer nursing students were considered allied health professionals. Volunteers met at a centrally located senior center at 7:30 AM on 1 of the first 2 established vaccination days, October 20 and 28, 2005. During each 45-minute meeting, researchers gave volunteers an introductory lecture on the biological properties, handling, and administration of LAIV. They were instructed on how to check vaccination consent forms, verify the child’s identity, and fill out vaccine administration verification forms. They also received adverse event protocols that explained the use of epinephrine and diphenhydramine, which were available at all schools for the unlikely event that a severe allergic reaction to LAIV occurred. All medical and allied health professional volunteers were given vaccine, maps, and contact information appropriate to their assigned schools that day.

The school principal or vice principal was responsible for coordinating parent and lay (nonmedical) volunteers for their school; these volunteers did not take part in the training described above. Upon arrival at the school, nonmedical parent and staff volunteers prepared the vaccination area previously designated by the school administrator. Depending on the school, the library, auditorium, nurse’s office, or a conference room was used. Each school provided hand disinfectant, epinephrine, and diphenhydramine to volunteers. Parent or staff volunteers escorted children to and from their classrooms, and ensured that each child presented a signed consent form and a vaccine administration verification form to the medical volunteers. A copy of this latter form was returned to parents to inform the children’s regular medical providers of this vaccination. Frequently, the school nurse had predetermined the optimal class order for vaccination, based on schedules for classes, lunch, recess, and dismissal times, to maximize efficiency and to minimize interference with the children’s education.

Qualitative Data Collection
The steering committee met in January and February 2006, at the CCHD for 3 formal postvaccination evaluation review meetings. At these meetings, representatives of CCHD, CCPS, UMSM, MedImmune, Inc., UMMC, and parent volunteers discussed and recorded their experiences during the entire vaccination initiative. They were asked to give qualitative feedback concerning 3 factors: positive aspects of the program, difficulties encountered, and suggestions on how to improve future efforts. They had previously been asked to provide a summary of any remarkable events that happened during the clinics. Responses were collected, edited, and summarized.

TABLE 2
Medical Volunteers, Vaccinees, LAIV Doses Administered, and Effort Involved in a Mass Influenza Vaccination Intervention, Carroll County, Maryland, 2005

<table>
<thead>
<tr>
<th></th>
<th>LAIV Dose 1</th>
<th>LAIV Dose 2</th>
<th>LAIV Dose 1+ Dose 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>October 20</td>
<td>October 28</td>
<td>November 6</td>
</tr>
<tr>
<td>No. of people</td>
<td>57a</td>
<td>19a</td>
<td>8b</td>
</tr>
<tr>
<td>Person-hours</td>
<td>256</td>
<td>86</td>
<td>36</td>
</tr>
<tr>
<td>LAIV doses</td>
<td>4257</td>
<td>1175</td>
<td>250</td>
</tr>
<tr>
<td>administered</td>
<td></td>
<td></td>
<td>5682</td>
</tr>
<tr>
<td>Children</td>
<td>4189</td>
<td>880</td>
<td>250</td>
</tr>
<tr>
<td>Staff members</td>
<td>68</td>
<td>295</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>363</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>363</td>
</tr>
</tbody>
</table>

LAIV, live attenuated influenza vaccine.

a Medical volunteers included physicians (MDs and DOs), and registered nurses who volunteered their time. Volunteers were trained on October 20 and 28, the same days the clinics were held.
b Eight “experienced” “veteran” volunteers were used without a training session that day.
c “Veteran” medical volunteers went to 4 to 5 schools per day and worked with 2 to 3 medical volunteers at each school.
d This figure includes 42 paid days by health department nurses and 87 volunteer-days by nonpaid medical volunteers. Some volunteers and health department nurses worked more than 1 day.

RESULTS
Quantitative Results
The vaccination dates, number of participating medical volunteers, and number of doses of LAIV administered on each vaccination day are shown in Table 2. Overall, 5319 (44%) of the 12,090 children enrolled in these 21 schools were vaccinated with at least 1 dose of LAIV during 8 days. School officials estimated that ∼20% of pupils were not eligible to receive LAIV because of underlying chronic health issues (predominantly asthma), so the true proportion of eligible children...
vaccinated could have reached an estimated 55%. Additionally, among the estimated 3547 (66% of vaccinees) children eligible to receive a second dose of LAIV, 3124 (88%) received it. At each clinic, staff vaccinated between 132 and 381 (median, 219) children, representing between 32% and 51% (median, 44%) of those children eligible for LAIV vaccine at each school. Additionally, 363 elementary school teachers and staff (90%) received LAIV, ranging from 6 to 28 (median, 13) in each school. The number of medical volunteers and amount of donated time are shown in Table 2. School nurses reported that collection and organization of the consent forms before vaccination required ~20 to 40 hours per school. Medical volunteers each spent an estimated 4.5 hours in their assigned schools, administering an average of 15 doses of LAIV per volunteer per hour, including setup and cleanup time in the school, but not including the estimated 1.5 hours needed for training (45 minutes), distribution of vaccine (15 minutes), and travel. Travel time for medical volunteers ranged between 10 and 50 minutes (according MapQuest) to drive from the central training site to their specific school. We estimate that at each school, 2 lay volunteers helped medical volunteers prepare the vaccination area and escort the children to and from the vaccination area.

**Qualitative Results**

In January and February, after all clinics had been held, we elicited qualitative feedback at 3 sessions from representatives of that effort. It was clear that the local health department was critical to organize and implement this school-based effort. CCHD administrators were key leaders in designing and implementing the program, ordering and storing vaccine, and recruiting many nurse volunteers. This latter group of nurses quickly became mentors of newer volunteers not familiar with the logistics and protocols of a clinic. It was also apparent that champions in the central administration of the CCPS were critical to make this program happen.

Few immediate adverse reactions to vaccination were encountered; none were serious. One child had a brief period of syncope immediately after vaccination and recovered uneventfully at the clinic. Even so, the child was transported by ambulance to a local emergency department as a precaution and was later released. The parents later reported that this child had a history of benign syncope. One pupil was mistaken for another child and vaccinated without parental consent after a breach in protocol concerning student identification. The parents of this child were notified immediately, and no adverse outcome was reported. This event underscores the constant effort and diligence required to properly identify children who have consented to participate.

Flexibility among all staff and volunteers was key; several situations required real-time modifications of the original plan. The success of these modifications was aided by good communication among the planning team members and their ability to make impromptu adjustments to procedures. For example, volunteers had to quickly and efficiently manage the unanticipated delivery of bulk vaccine, instead of smaller, more usable packages better suited to a single school. Volunteers were able to obtain appropriate additional containers and to repackage the vaccine to meet the individual needs of each of the 21 schools. In addition, the number of clinic days planned was not sufficient to compensate for a 25% no-show rate among volunteers. In addition, only 1 day (December 9) was scheduled for all second-dose clinics in all schools. However, a snowstorm forced school closings that day, forcing clinics to be rescheduled. To accomplish this, the planning committee recruited small teams of 8 to 12 relatively experienced medical volunteers who had worked in previous SLV clinics to administer all second doses of LAIV during 5 school days, December 12 to 16, 2005. Thus, the entire intervention occurred over 8 days instead of the planned 3 days. In addition, when the schools were closed during these snow days, researchers had to quickly arrange for the unanticipated 2-week freezer storage of 3550 doses of LAIV that had been delivered the previous day.

Community support for this effort was important. The use of the community senior center was essential to establishing a central training and vaccine distribution site. Local police enlisted trustees of the jail to help load vaccine into the cars of volunteers. Elementary school staff members helped to designate a vaccination site within the school and to organize lay parent volunteers. These lay volunteers were easily integrated into the vaccination team, and were essential for escorting children to and from their classrooms, and, in some clinics, for ensuring that children had their vaccine consent forms in hand. In many cases, the volunteers were offered free lunch from the school cafeteria.

In general, the public accepted the use of LAIV and the vaccination program. Only a few parents or residents demonstrated any active resistance to the program. A few parents contacted the school system or local health administrators with concerns about the use of a live influenza vaccine in the schools. Just before the immunization clinics, a local radio station advised parents to keep their children home from school during LAIV vaccination days, and isolated physicians recommended that parents not allow their children to participate in the program. Six elementary school staff were granted sick
leave because of their concern about the vaccination initiative, and one who indicated that her personal physician had advised her not to be present on vaccination day. Even so, school principals did not report a widespread increase in absenteeism during these vaccination days. Members of the planning committee calmly and effectively addressed the few dissenters to the program. In general, the response of school personnel, parents, and community members to the initiative was very favorable.

Most of the program organizers and volunteers were positive about their involvement in the vaccination program. They noted that the program was efficiently organized, and that it was easy to distribute vaccine information and consent forms. They also noted that the children were receptive to the vaccine and that the volunteers were easy to train. Interagency cooperation among the CCHD, CCPS, senior center, local law enforcement, and faculty from the UMSM was evident and regarded as an important positive feature. Several school administrators and parents expressed their desire to repeat this effort the next year, which in fact did occur in all 21 elementary schools.

Even so, several difficulties were noted. In addition to the shipment package size problem and weather-related obstacle described above, the school staff noted that early fall is a busy time for teachers and school nurses. CCPS administrators were frustrated by the large number of children ineligible to receive LAIV, often because they had asthma. CCPS administrators (M.H. and S.G.) estimated that at least 20% of the children were not medically eligible to receive LAIV. However, such children, who are at highest risk for influenza disease and its complications, were not a focus of this LAIV-based effort.

Requests for additional information from the community and news media required more time from CCPS and CCHD officials than anticipated. CCHD nurses provided 33% of the medical vaccinating force, which meant that other health department programs were potentially short-staffed. However, no regularly scheduled health department clinics were canceled. In many cases, real-time communication in the field between program organizers and volunteers was difficult once the volunteers were dispersed to the schools.

Discussion of these issues generated suggestions for future improvements, including the need to request vaccine shipments in smaller packages and the need to plan storage contingencies in the event of inclement weather. Walkie-talkies or direct-connect cell phones could have improved communication during vaccine clinic days. All members felt that community education programs regarding the impact of influenza and the benefits of vaccination would help to increase the number of children who would be vaccinated and help parents accept this new type of program. It was also suggested that the local health department could screen and deputize medical volunteers as well as provide malpractice coverage. The use of parent lay volunteers was felt to be crucial in making the clinic effort more efficient and in confirming the identity of the vaccinees. Finally, procedures to increase vaccination rates for children who require TIV instead of LAIV need to be incorporated into future large-scale mass vaccination programs.

DISCUSSION

This program illustrates the feasibility of creating a collaborative group of professional and lay volunteers supported by paid public health nurses to implement a large-scale mass influenza vaccination program over a relatively short period of time. Approximately 44% of the public elementary school pupils in the county were vaccinated, using nearly 9000 doses of influenza vaccine administered in 21 schools during 8 designated vaccination days. Follow-up clinics were very successful, administering a second dose of LAIV by the end of December to nearly 90% of those who needed it for full immunization.

As noted, the use of volunteers was critical to the success of this program. Although the local health department nurses led this effort, the use of medical volunteers was key, and could be very important to the ultimate sustainability of an annual mass vaccination program. The use of volunteers rather than paid vaccine administrators reduces the financial burden of a large-scale vaccine effort. Additionally, the creation of a SLV program using a standing volunteer force could help the community better prepare for and handle a biological catastrophe, particularly from a pandemic influenza outbreak. Annual SLV programs would provide a very good drill for establishing a working volunteer registry and fine-tuning the methods needed to successfully manage other public health emergencies. A properly staffed local or county health department registry could verify medical licensure, perform background checks, and assist in obtaining liability coverage for medical volunteers. Experienced health department nurses could serve as mentors for these efforts.

Organizing medical volunteers to serve such clinics is a realistic goal. Since the inception of our nation, volunteerism has been an important component of American culture and Americans have always volunteered in times of war, tragedy, and need. Examples of organized, medically oriented volunteers include the Ladies’ Aid Society, American Red Cross, United Way, Remote Area Volunteers, Medical Reserve Corps, and Points of Light Foundation, among
Tuckman and Chang examined characteristics of medical volunteers.26 They estimated that about 1 in 10 US adults are medical volunteers in some capacity. Volunteers’ motivations were their stated desires to help others and to be needed, both likely to be fulfilled by participating in an immunization effort. A recent review indicated that volunteering can have both physical and mental health benefits.27

Medical volunteers can be recruited from many sources, including local hospitals, professional schools (nursing, medicine, osteopathy, pharmacy, and dentistry), state or local emergency preparedness nurse and physician registries, parish nurse organizations, and, in some states, emergency medical technicians and paramedics. Medically licensed parents of enrolled children potentially can be a good source of volunteers. Such an abundance of sources suggests that establishing a large medical volunteer force is realistic.

Lay volunteers, including parents and school staff members, were crucial to this effort. By handling the logistical matters, they increased the efficiency of the medical volunteers administering the vaccine. Many schools encouraged parents to volunteer to help teachers with classroom functions and to assist the administration for school functions ordinarily. Lay volunteers can help make a SLV program sustainable.

With the recent recommendation for broader age coverage of children, clinicians may find it difficult to vaccinate all children in their practice each year during a short period in the fall. School-located influenza immunization with LAIV and TIV would be a practical way to help overcome this difficulty. A school program that immunized healthy as well as chronically ill and immunosuppressed children would help reach the goal of community herd immunity. The virtually universal recommendations to offer influenza vaccine to almost all children 6 months of age and older would likely make a second dose of influenza vaccine in any one season unnecessary which should help streamline school-located immunization programs.

Health departments can be very influential in developing and implementing a SLV effort. Combining the efforts of health department personnel with those of volunteers can help to create a program commensurate with the budget constraints of most health departments. However, consideration of vaccine payments and reimbursement for SLV projects was not addressed in this pilot program, because the vaccine was donated. Future projects will need to address the feasibility of seeking reimbursement from third-party payers and other methods of sustainably delivering influenza vaccine to children on a large scale.

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REFERENCES


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