

Elementary School-Based Influenza Vaccination Programs: Findings to Inform Pandemic Vaccination Campaigns

Matthew Rousculp,¹ Theresa Gilligan,² Kelly Hollis,² Jane Griffin,² Mark Price,² Michelle Thompson,² Valerie Williams,² Seth Toback¹

¹MedImmune, Gaithersburg, MD, United States; ²RTI Health Solutions, Research Triangle Park, NC, United States

BACKGROUND

- Vaccination of school-aged children against influenza is an important strategy for reducing the spread of the disease in households and communities.^{1,2,3}
- Current Advisory Committee on Immunization Practices (ACIP) guidelines recommend that all school-aged children receive an annual influenza vaccination.⁴
 - Despite these recommendations, healthy school-aged children have a vaccination rate of approximately 20%.⁵
- One approach for improving the vaccination rate of school-aged children is through the use of school-located influenza vaccination (SLIV) programs.
- Anecdotal reports of successful SLIV programs have been described in the medical literature.^{2,6-14}
 - Programs have not been well characterized from the perspective of educational stakeholders such as teachers and school administrators.

OBJECTIVES

- To describe the logistics and outcomes of elementary SLIV programs from the perspectives of elementary school administrators, elementary school teachers, and health care providers (HCPs).
- To elicit information regarding program initiation, funding and logistics, school disruption, and successful programs.

METHODS

The study consisted of two phases.

Phase 1:

- Focus groups were conducted with 21 participants in February and March of 2009 in two school districts with 39 elementary schools.
- Information was elicited about SLIV programs to develop questionnaires for study phase 2.

Phase 2:

- Semiqualitative, exploratory study that included in-depth telephone interviews with key stakeholders involved in the oversight and administration of elementary SLIV programs during the 2008–2009 influenza season.
- Key stakeholders included HCPs (including district and school nurses), school administrators, and teachers (including classroom paraprofessionals).
- A total of 8 districts that administered an SLIV program participated in the study. Five school districts offered only intranasal vaccines, 2 districts offered both intranasal and injectable vaccines, and 1 district offered only the injectable vaccine.
- All surveys were conducted via telephone by specially trained interviewers during March, April, and May of 2009.
- Frequency distributions (by stakeholder subgroup) used to summarize phase 2 survey questions. Where appropriate, standard item-level descriptive statistics (e.g., mean, standard deviation, median, percentage missing) were calculated. Missing data were not imputed; consequently, some sample size numbers and percentages reflect different totals.*

*Missing data can be due to the fact that not all questions were asked of every respondent because of time constraints, the conversational nature of the interview, or because of uncertainty expressed by the interviewee. In some cases, an interviewee responded that he or she would get the necessary information to answer the question, but ultimately provided no additional information. Interviewers concentrated on capturing the most important information from each respondent based on an initial assessment of the respondent's knowledge of the program. Because the data collection was, by nature, a conversational interview, the many reasons why responses are missing could not be coded systematically.

†It is possible that the number of schools is underestimated because HCPs representing a district were not asked to provide information for all the schools in which they worked.

RESULTS

- Seventy-two telephone interviews, representing an estimated 34 elementary schools,[†] were conducted, with a range of 5 to 13 (mean = 9) participants from each of the 8 school districts; participants included 30 HCPs, 16 school administrators, and 26 teachers (Table 1).

Table 1. Survey Participants

Role	Stakeholders (N = 72)
Teachers/paraprofessionals	26 (36.1%)
Pre-K or kindergarten	7 (9.7%)
Grades 1, 2, or 3	9 (12.5%)
Grades 4 or 5	10 (13.9%)
Administrators	16 (22.2%)
Nurses	30 (41.7%)

Table 2. Education Level of Participants

Education	HCPs (N = 30)	Administrators (N = 16)	Teachers (N = 26)
High school diploma	2 (6.7%)	0	0
Some college	6 (20.0%)	0	1 (3.8%)
Associate's degree	9 (30.0%)	0	0
Bachelor's degree	8 (26.7%)	1 (6.3%)	17 (65.4%)
Master's degree	5 (16.7%)	8 (50.0%)	7 (26.9%)
Doctoral degree	0	1 (6.3%)	0
Other	0	6 (37.5%)	1 (3.8%)

Program Initiation

- 80% of HCPs and 50% of administrators reported that their school or district's SLIV program has been in place for ≤ 3 years.
- HCPs and school administrators reported that a primary motivation for SLIV programs was to positively impact learning by reducing influenza-related absenteeism and reducing staff exposure to influenza.
 - More school administrators (n = 10, 63%) reported involvement in the decision to offer the SLIV programs in their own school or district than HCPs (n = 11, 37%).[‡]
 - However, HCPs reported greater involvement in *planning and coordinating* the influenza vaccination program than administrators; 22 (73%) HCPs reported that they were very involved in planning and coordinating the influenza vaccination program in their school or district.
- Although HCPs were the main party responsible for implementation of the SLIV programs, 12 (40%) HCPs indicated that the program would continue without any problems if they were to leave their position, suggesting that the programs were well-organized and operating efficiently.
- The majority of HCPs and school administrators rated the planning and program initiation process as either "very easy" (10% of HCPs and 44% of administrators) or "easy" (43% of HCPs and 38% of administrators).
 - HCPs reported that they became more comfortable and efficient with processes and paperwork in subsequent years, and planning and implementing the influenza vaccination program in subsequent years was reportedly much less difficult.

Program Funding

- Six HCPs reported that 100% of their vaccines came from the Vaccines for Children (VFC) program. Four additional HCPs indicated the local health department, state health authorities, or state budgets funded 100% of vaccines.
 - The remaining respondents reported receiving funding from multiple sources, including those listed above, as well as funding from the school system, national grants, manufacturer's donations, and other sources.

[‡] Teachers were not asked about SLIV program initiation.

Table 3. Vaccination Consent Process and Program Communication

Question	HCPs (N = 30)	Administrators (N = 16)	Teachers (N = 26)
How were consent forms distributed and collected? ^a			
Sent home and returned with students	26 (86.7%)	14 (87.5%)	26 (100%)
Provided to parents in person	17 (56.7%)	7 (43.8%)	4 (15.4%)
Collected at home by a facilitator or translator	4 (13.3%)	0	1 (3.8%)
Other ^b	18 (60.0%)	6 (37.5%)	5 (19.2%)
Were consent forms and program information provided in other languages? ^c			
Yes	26 (86.7%)	11 (68.8%)	11 (42.3%)
No	3 (10.0%)	3 (18.8%)	14 (53.8%)

Note: Modal responses are in bold.

^a Percentages add to greater than 100% because respondents were asked to choose all options that apply.

^b Participants described sending consent forms via United States mail or e-mail, or having them signed at parent-teacher conferences.

- On a 4-point scale from 1 ("very difficult") to 4 ("very easy"), teachers rated the level of difficulty in obtaining completed consent forms from parents a mean score of 2.88 (SD = 0.8; range 2 to 4).

Program Logistics

- According to HCPs, the vaccinations were often provided in the lunch room or cafeteria (n = 6, 20%) or in the school nurse's office or clinic (n = 10, 33%), but also in various other places (n = 23, 76.7%), such as a vacant classroom, conference room, teachers' workroom.
- HCPs reported that the screening process for medical eligibility was the most important determinant in deciding whether a child would receive the intranasal or injectable vaccine.
 - Of the schools that offered both vaccines, the intranasal vaccine was considered to be the default vaccine unless the child was ineligible.
 - One difficulty encountered in the screening process was discrepancies between parental information found on the consent form and school medical data; asthma was the principal medical condition for which conflicting information was obtained.

Table 4. Vaccine Delivery

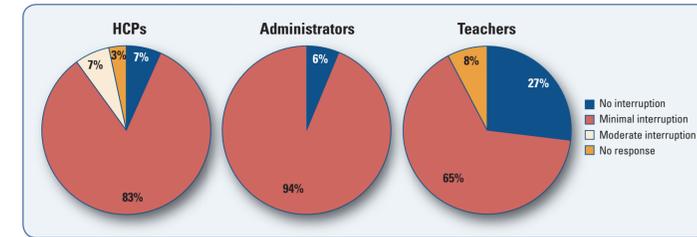
Question	HCPs (N = 30)	Administrators (N = 16)	Teachers (N = 26)
Are vaccines provided during the school day?			
Yes	29 (96.7%)	15 (93.8%)	24 (92.3%)
No	0	0	2 (7.7%)
If during the school day, how are students vaccinated? ^a			
The entire classroom goes all at once	12	4	5
A few students go at a time	7	3	11
One student at a time	4	1	0
If during the school day, who takes students to get the vaccine? ^a			
Teacher	17	5	6
Paraprofessional	12	9	8
Nurse	12	5	8
Volunteer	11	3	1

Note: Modal responses are in bold.

^a Percentages could not be reliably calculated due to skip logic and the conversational nature of the interview.

School Disruption

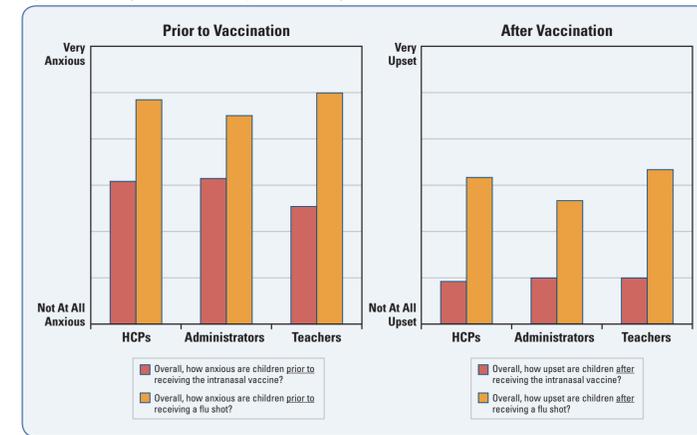
Figure 1. Level of Interruption During School Vaccinations



- The consensus of HCPs, elementary school administrators, and teachers was that there was minimal school and classroom disruption during the times when students were being vaccinated (Figure 1).

- HCPs estimated that the average total time required to vaccinate one child was about 2.4 minutes (SD = 2.1; median = 1.0; range = 1.0 to 10.0) and the total time to vaccinate all eligible children in a single school ranged from less than 1 hour to a few days.
- Teachers, when asked to recall the total time required to vaccinate all participating children in a single classroom, estimated that the process took on average 13.3 minutes (SD = 4.7; median = 13.0; range = 5.0 to 25.0).
- Injections were reported to take longer to administer than the intranasal flu vaccine due to vaccine preparation and student cooperation.
- HCPs, elementary school administrators, and teachers were all asked about children's anxiety/distress before and after vaccinations (Figure 2).
- Stakeholders reported that children exhibited less anxiety with the intranasal vaccine. (Figure 2).

Figure 2. Mean Reported Child Anxiety and Level of Upset



Successful Programs

- HCPs identified the following features as the most important sources of program success:
 - Adequate planning and coordination (n = 20, 66.7%)
 - Existence of a dedicated program coordinator (n = 19, 63.3%)
 - Reliable funding stream (n = 18, 60.0%)
- Other necessary features of a successful program included "support by the district and in each individual school," "endorsement by high-ranking medical advocate or professional," and "getting the word out that the program is available."

CONCLUSIONS

- Successful implementation of an SLIV program requires extensive advance planning and preparation in terms of procuring financing, completing paperwork, coordinating stakeholders, managing logistics, and appropriating space and staff.
 - Schools or districts considering implementing influenza vaccination programs, including pandemic, should keep these success factors in mind.
- Additional investigation is needed to further explore current findings on classroom disruptions and how the use of intranasal versus injectable vaccine impacts the educational atmosphere in the time immediately before and after vaccination.

REFERENCES

- Basta N, Chao D, Halloran M, Matrajt L, Longini Jr I. Strategies for pandemic and seasonal influenza vaccination of school children in the US. *American J Epidemiology* 2009;170:679-86.
- King JC, Jr., Stoddard JJ, Gaglani MJ, Moore KA, Magder L, McClure E, et al. Effectiveness of school-based influenza vaccination. *N Engl J Med* 2006;355:2523-32.
- Loeb M, Russell M, Moss L, Fonseca K, Fox J, Earn D, et al. Effect of influenza vaccination of children on infection rates in Hutterite communities. *JAMA* 2010;303:943-50.
- Centers for Disease Control and Prevention. Influenza vaccination coverage among children and adults—United States, 2008-09 influenza season. *Morb Mortal Wkly Rep* 2009;58:1091-5.
- Centers for Disease Control and Prevention. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2009. *Morb Mortal Wkly Rep* 2009;58:RR-8.
- Carpenter LR, Lott J, Lawson BM, Hall S, Craig AS, Schaffner W, et al. Mass distribution of free, intranasally administered influenza vaccine in a public school system. *Pediatrics* 2007;120:e172-8.
- Effler PV, Chu C, He H, Gaynor K, Sakamoto S, Nagao M, et al. Statewide school-located influenza vaccination program for children 5-13 years of age, Hawaii, USA. *Emerg Infect Dis* 2010;16:244-50.
- Hull HF, Frauendienst RS, Gundersen ML, Monsen SM, Fishbein DB. School-based influenza immunization. *Vaccine* 2008;26:4312-3.
- Mears CJ, Lawler EN, Sanders LD, III, Katz BZ. Efficacy of LAIV-T on absentee rates in a school-based health center sample. *J Adolesc Health* 2009;45:91-4.
- King JC, Jr., Cummings GE, Stoddard J, Readmond BX, Magder LS, Stong M, et al. A pilot study of the effectiveness of a school-based influenza vaccination program. *Pediatrics* 2005;116:e868-73.
- Borja MC, Amidon C, Spellings D, Franzetti S, Nasuta M. School nurse perspectives. *J School Nurs* 2009;25(Suppl 1):295-365.
- Li C, Freedman M, Boyer-Chu L. Championing school-located influenza immunization: the school nurse's role. *J School Nurs* 2009;25(Suppl 1):185-285.
- Ransom J. School-located influenza vaccination clinics: local health department perspectives. *J School Nurs* 2009;25(Suppl 1):135-175.
- Wiggs-Stayner KS, Purdy TR, Go GN, McLaughlin NC, Tryznya PS, Sines JR, et al. The impact of mass school immunization on school attendance. *J School Nurs* 2006;22:219-22.

DISCLOSURE

This study was conducted with and on behalf of MedImmune, LLC.

CONTACT INFORMATION

Matthew D Rousculp, PhD, MPH
 Director, Health Outcomes & Pharmacoeconomics (HOPE)
 MedImmune, LLC
 1 MedImmune Way (45C45)
 Gaithersburg, MD
 Telephone: +1.301.398.5984
 Fax: +1.301.398.8984
 E-mail: rousculp@medimmune.com
 Presented at: National Immunization Conference
 April 19-22, 2010
 Atlanta, GA, United States