Factors Associated with Increased Vaccination in 2009 H1N1 School-Located Influenza Vaccination Programs

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Introduction

- In the United States, school-located influenza vaccination (SLIV) programs have increased significantly in recent years owing to expanding recommendations for the annual vaccination of children and in response to pandemic influenza.
- In June 2010, the Office of Inspector General (OIG) issued a public report regarding 38 single-day urban elementary H1N1 SLIV programs.
  - Programs were conducted from November–December 2009 in 6 localities in Arizona, Maryland, Minnesota, Missouri, New York, and Virginia.[2]
- Data were collected via onsite interviews and observations, follow-up email surveys, and reviews of program documentation.
- To the best of our knowledge, this report is the only prospective, quantitative assessment of multiple concurrent, geographically diverse US SLIV programs.

Objective

- To analyze the OIG data to identify factors associated with higher vaccination rates among elementary school 2009 H1N1 SLIV programs

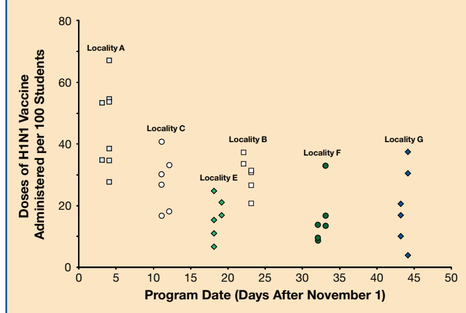
Methods

- Available data for each of the 38 schools in the 6 localities were extracted from the OIG report for analysis.
- The main outcome for this analysis was the vaccination rate achieved by schools in each locality during the SLIV programs.
  - Vaccination rate was calculated using the number of H1N1 vaccine first doses administered as the numerator and the number of students enrolled as the denominator.
- Additional data available included
  - The date of the program (calculated as days after November 1)
  - Timing of vaccine distribution (during or after school hours)
  - Vaccine type (injectable vs nasal spray)
  - Consent process
  - Number of days allowed for return of parental consent
  - Number of staff involved in the SLIV program
  - Whether children who were not students (eg, siblings) were vaccinated
- Because of the similar characteristics (measured and unmeasured) of programs in each locality, an analysis was conducted at the locality level to identify potential associations between program characteristics and vaccination rates.
- Differences between localities were examined by comparing the mean number of first doses per 100 students using the pooled *t* test for schools in the localities in question. Variance equality was determined using the F statistic.
- A statistically significant difference in the mean number of first doses per 100 students was accepted at $P \leq 0.05$. All analyses used SAS v.8 (SAS Institute, Cary, NC).

Results

- The 38 SLIV programs occurred between November 4 and December 15, 2009. Each locality had between 6 and 8 schools in the survey; program implementation characteristics were generally similar in each locality (localities identified as A–F; **Table 1**).
- The mean number of enrolled students per school ranged from 394–763 across localities.
- The mean number of first doses administered in the SLIV programs ranged from 16–46 per 100 students across localities **(Table 1)**.
- Schools in localities A, B, and C administered significantly more first doses per 100 students than schools in localities E and F **(Table 1)**.
- In localities B, C, D, and F, all programs were conducted during school hours with parental consent obtained in advance by distributing consent forms online, by mail, or by sending the forms home with children 7–61 days in advance of the program.
  - All programs in locality E were conducted after school hours with parental consent obtained on site.
- All localities used the H1N1 injectable and nasal spray vaccines.
  - 3 of 6 used the nasal spray vaccine predominantly (range, 59%–74% of vaccinations).
  - 3 of 6 used the injectable vaccine predominantly (range, 67%–73%).
  - Across individual SLIV programs, 87% (n=33) of the SLIV programs used both vaccines and 13% (n=5) used only the injectable vaccine.
- Program date was the principal factor associated with increased vaccination **(Figure 1)**. Programs conducted during the first week of November (locality A) administered more first doses (mean, 46 per 100 students) than later programs (mean, 21 per 100 students; $P<0.01$).
  - There was a trend toward decreasing vaccination rates across localities with increased time after November 1 **(Figure 1)**.
  - The exception to this trend was locality E (mean first doses per 100 students, 16; vs locality C, 28 [$P=0.05$]; vs locality B, 30 [$P<0.01$]).
    - All SLIV programs in locality E were conducted after school hours without advance parental consent; parental consent was obtained on site on the day of the programs.

Figure 1. Doses of H1N1 Vaccine Administered by Program Date and Locality



Each school-located influenza vaccination program is represented by a single data point.

Table 1. Locality Characteristics

Characteristic	Locality A	B	C	D	E	F
SLIV programs surveyed, n	8	6	6	6	6	6
Days after November 1, mean	4	23	11	44	18	33
Programs during school hours, %	50	100	100	100	0	100
Staff at SLIV site, mean	10	12	13	6	31	7
Staff per 100 students, mean	1.5	2.3	2.8	1.6	4.5	1.9
Days to provide consent, mean	10	35	25	27	0	44
Programs with consent forms available online, %	100	0	33	0	0	0
Programs vaccinating children who were not students, %	25	0	0	0	100	0
Students enrolled per school, mean	689	572	495	407	763	394
First doses of H1N1 vaccine administered, mean	308	169	139	83	134	57
First doses of H1N1 vaccine administered per 100 students, mean	46*	30*	28†	20	16	16

SLIV=school-located influenza vaccination.
*$P<0.01$ vs Locality E or F.
†$P<0.05$ vs Locality E or F.

Limitations

- The analysis is based on a limited, nonrandom sample and therefore may not accurately reflect all US 2009 H1N1 SLIV programs.
- Because all programs were conducted in response to the H1N1 pandemic, factors affecting vaccination uptake could differ compared with nonpandemic, seasonal influenza.
- Other variables that could affect vaccination uptake, including parental and staff knowledge and attitudes, community demographics, local media coverage, and clarity of program communications, were not evaluated and were not available for the present analysis.

Conclusions

- **In this analysis of 38 elementary school H1N1 SLIV programs, those conducted near the peak of H1N1 activity achieved higher vaccination rates.**
- **The outcomes of later programs suggest that SLIV programs may achieve higher vaccination rates if conducted during school hours with parental consent obtained in advance; programs after school hours with on-site consenting may be less successful.**
- **Parental demand and program design are important for successful SLIV programs.**

References

1. Center for Infectious Disease Research and Policy. H1N1 Lessons Learned: Vaccination campaign weathered rough road, paid dividends. Available at: http://www.cidrap.umn.edu/cidrap/content/influenza/swineflu/news/apr3010campaign.html. Accessed January 3, 2011.
2. Wright S. Memorandum Report: 2009 H1Nl School-Located Vaccination Program Implementation, OEI-04-10-00020. Available at: http://oig.hhs.gov/oei/reports/oei-04-10-00020.pdf. Accessed January 3, 2011.

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