

# The Impact of Mass School Immunization on School Attendance

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**ABSTRACT:** The purpose of this study was to assess the impact a free, on-site influenza immunization program could have on attendance in Title 1 schools. Four Title 1 elementary schools participated in the study. Students at 2 schools were offered free FluMist® immunizations on site, and students at 2 control schools were not. Compliance on receiving FluMist® was measured on the percentage of students participating after evaluating for medical exclusions. Documentation on the reason for absences at all 4 schools included self- or parent-reported influenza. Attendance rates for the year also were compared with the previous year for all 4 schools. A comparison was done of total days absent versus total days enrolled between schools receiving FluMist® and schools not receiving the vaccine. Despite the fact that FluMist® is a new vaccine and is not required for children, 57% of those medically eligible to receive it had parental permission and received the vaccine. The 2 schools receiving FluMist® increased their attendance rates from 95.3% and 93.9% to 96.1% and 95.8%. Previously, the comparison schools each had a 94.6% attendance rate; one fell to 94.4% and the other rose very slightly to 94.7%. The differences in self- or parent-reported influenza absences were not significant. However, the difference in days absent between individual vaccinated and nonvaccinated schools was statistically significant.

**KEY WORDS:** absenteeism, attendance, FluMist®, immunization, influenza, Title 1 schools

## INTRODUCTION

This study was undertaken to assess the impact a free, on-site influenza immunization program could have on attendance in Title 1 schools. The benchmark

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attendance rate for the state of Indiana in the 95th percentile would be 97.8%. School nurses noted that none of the local Title 1 schools met this benchmark. Title 1 is a federal entitlement program allocated on the basis of student enrollment and census poverty data. The U.S. Department of Education disburses funds to state education agencies, which then distribute these funds to local school districts. The intent is to ensure that all children have an opportunity to obtain a high quality education and to reach grade-level proficiency (No Child Left Behind Act, 2001).

Previous research has shown that school absentee rates increase during influenza season (Neuzil, Hohlbein, & Zhu, 2002). The goal of the Parkview Community Nursing Research Group was to increase school attendance rates. Members of the group observed that influenza and absences due to influenza were challenges each winter, particularly in schools with a high population of children with a low socio-

economic status. Many of these school families lived in multifamily dwellings, a situation that increased person-to-person contact and promoted the spread of bacteria and viruses. Although influenza vaccines were available in the community, these families often did not have the funds or transportation to receive preventive health care.

### LITERATURE REVIEW

The Centers for Disease Control and Prevention (CDC) stated that the primary option for reducing the number of influenza cases is immunoprophylaxis with vaccine (CDC, 2005). *Influenza virus vaccine live, intranasal* (FluMist®) is a live, trivalent, nasally-administered vaccine intended for active immunization to prevent disease caused by influenza A and B viruses in healthy children and adolescents 5–17 years of age and healthy adults 18–49 years of age (MedImmune Vaccines, Inc., 2005).

Belshe and colleagues (1998, 2000) described a study in which FluMist® was administered to 20,228 subjects in clinical studies. The population that was evaluated included 10,297 healthy children 5–17 years of age. The Pediatric Efficacy Study was a multicenter, randomized, double-blind, placebo-controlled trial performed on healthy U.S. children to evaluate the efficacy of FluMist® against confirmed influenza over two successive seasons. The overall efficacy of FluMist® against culture confirmed wild-type influenza was 86.9%.

The SchoolMist Study Group recently examined the effect of FluMist® on elementary school children on several influenza-related outcomes in families. Three schools participated in the study, with one school receiving the vaccine. In that school, 40% of the children received the FluMist® vaccine. All families from the three schools were sent an anonymous questionnaire asking for a 7-day recall of “fever or respiratory illness (FRI)-related” medical visits, medications purchased, or days of school or paid work lost during the peak influenza week. There were significant reductions in the FRI-related outcomes between the target school and the comparison schools. The increases in absentee rates from baseline to the peak influenza outbreak period were not significant between the target and the

control schools. However, within the target school, there was a statistically significant, smaller increase in absenteeism rates in the FluMist® recipients compared with the non-FluMist® recipients (King et al., 2005).

### METHODOLOGY

Funding for the vaccine cost of the study was obtained from the Parkview Hospital Community Health Improvement Program. Institutional Review Board approval was obtained from both Parkview Hospital and the local school system.

Free vaccinations were offered to all staff and students who were medically eligible at the elementary schools designated to receive vaccines.

The Parkview Community Nursing Research Group compared four Title 1 elementary schools in a large urban school system. The schools were comparable in size, race, and socioeconomic status, as determined by the percentage of children qualifying for free or reduced lunch (Table 1). Free vaccinations were offered to all staff and students who were medically eligible at the elementary schools designated to receive vaccines. School nurses evaluated current medical histories and checked for immediate medical exclusions. Staff and students who had prior documentation of medical conditions that excluded them from the study were sent a letter explaining that free flu immunizations were being offered, but their medical condition prevented them from obtaining FluMist®. They were referred to other sources to obtain an inactivated influenza vaccine. Staff and students who had no such documentation were given an educational sheet explaining the FluMist® study and a permission slip in either English or Spanish. School nurses and a Spanish-speaking social worker were available to answer questions from parents. A pediatrician was available for any screening questions the nurses might have.

As the day of vaccination approached, school nurses called parents to encourage them to return forms

**Table 1.** School Characteristics 2003/2004

School	Vaccine Schools		Nonvaccine Schools	
	1	2	1	2
Number of students	264	287	392	349
% free/reduced lunch	92%	87%	82%	89%
White	35%	34%	35%	53%
Black	38%	33%	37%	34%
Hispanic	20%	24%	20%	6%
Asian	2%	0%	0%	0%
Multirace	7%	6%	7%	6%
Attendance 2003/2004	95.3%	93.9%	94.6%	94.6%

and permission slips. On the day of the vaccinations, a nurse went into each classroom and called all the children who had signed permission slips from parents and whose medical eligibility had been reconfirmed. Children age 5–8 years who had not been vaccinated previously with FluMist® received two doses of FluMist® 60 days apart. Children and adults age 9–49 received one dose. Approximately 0.25 ml was administered into each nostril while the recipient was in an upright position. A total of 277 children were vaccinated.

### RESULTS

There were 273 students enrolled in Vaccine School 1. Although 51 students were medically excluded, 222 students were eligible to obtain FluMist®. Of those who were medically eligible, 143 students (64%) obtained the vaccine. Due to initial letters, follow-up letters, and phone calls, the parental response rate (i.e., returning a completed form to school, whether agreeing or not agreeing to have child participate) was 78%.

There were 323 students enrolled in Vaccine School 2, of which 273 were eligible to obtain FluMist®; 50 students were medically excluded. Of those who were medically eligible, 134 students (49%) obtained the free FluMist® vaccine. The parental response rate was 60%.

Teachers and school staff also were offered free FluMist®. Due to age and other medical conditions, a

large number of staff were medically excluded. Twenty-two staff members from each school obtained FluMist®.

The attendance rates at the two schools receiving FluMist® increased, whereas the nonvaccine schools had a decrease in overall attendance.

Attendance was calculated by dividing total days in attendance by membership days (number of student enrolled per day). The attendance rates at the two schools receiving FluMist® increased, whereas the nonvaccine schools had a decrease in overall attendance. Differences in the self- or parent-reported influenza absences were not significant (Table 2). However, difference in days absent between individual vaccinated and nonvaccinated schools was statistically significant with a chi-square *p* value of <.001 (Table 3).

### DISCUSSION

The 57% vaccination rate for medically eligible children may have created some “herd immunity” and protected a larger number of children than those immunized. Herd immunity happens when a part of a population has been vaccinated and then has antibodies that neutralize a virus, making vaccinated individuals less likely to transmit a virus to the unvaccinated population. The proportion of children vaccinated that is required to control the spread of influenza is unknown. Piedra and others (2005) found that vaccination of approximately 20–25% of children 1.5–18 years of age resulted in protection of 8–18% in adults older than 35 years of age. Hurwitz and colleagues (2000) gave inactivated vaccine to children in day care and found infection rates of older siblings reduced by 80% compared with siblings of unvacci-

**Table 2.** Attendance Rates and Influenza Absences of Vaccine Schools and Nonvaccine Schools

	Vaccine Schools		Nonvaccine Schools	
	1	2	1	2
Attendance rate 2003/2004	95.3%	93.9%	94.6%	94.6%
Attendance rate 2004/2005	96.1%	95.8%	94.4%	94.7%
Self- or parent-reported influenza absence days	39	56	61	84

**Table 3.** Statistical Comparison of Individual Vaccine and Nonvaccine Schools

(School 1 in Vaccine vs. School 1 in Nonvaccine; School 2 in Vaccine vs. School 2 in Nonvaccine)									
School	Vaccine Group			School	Nonvaccine Group			Statistical Test	
	Days Enrolled	Days Present	Days Absent		Days Enrolled	Days Present	Days Absent	Chi Square	<i>p</i> Value*
School 1	49,269	47,372	1,897	School 1	54,982	51,933	3,049	165.12	<0.001
School 2	42,396	40,633	1,763	School 2	47,896	45,370	2,526	61.590	<0.001
Total	91,665	88,005	3,660	Total	102,878	97,303	5,575	217.975	<0.001

  

(School 1 in Vaccine vs. School 2 in Nonvaccine; School 2 in Vaccine vs. School 1 in Nonvaccine)									
School	Vaccine Group			School	Nonvaccine Group			Statistical Test	
	Days Enrolled	Days Present	Days Absent		Days Enrolled	Days Present	Days Absent	Chi Square	<i>p</i> Value*
School 1	49,269	47,372	1,897	School 2	47,896	45,370	2,526	112.956	<0.001
School 2	42,396	40,633	1,763	School 1	54,982	51,933	3,049	97.930	<0.001
Total	91,665	88,005	3,660	Total	102,878	97,303	5,575	217.975	<0.001

\* Either one- or two-tailed.

nated day care attendees. Longini and Halloran (2005) stated the goal should be to vaccinate 70% of schoolchildren, although if only 50% of the schoolchildren are vaccinated, community-wide transmission would be reduced.

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The attendance rate increases at the FluMist® schools and decreases at the control schools were significant. It was difficult to track the “self-reports” of absence from influenza (Table 2) due to several factors, including no parent call, a message with no reason for absence, multiple staff taking calls, and lack of education of parents on what constitutes influenza. If this study were replicated, we would recommend that “self-reports” of influenza be discouraged and that a study on a larger number of schools would assess only the overall attendance rate changes.

### IMPLICATIONS FOR SCHOOL NURSING PRACTICE

This study found that a free, on-site, mass immunization with FluMist® had a positive impact on school attendance. One of the goals of the National Association of School Nurses is to promote the health and academic success of children. This can be facilitated by ensuring that all students are immunized. In areas where immunization rates are low and parents do not have the resources for immunization services, school nurses can work with community organizations to provide free, on-site immunizations. By reducing the incidence of influenza in the school setting, absentee rates can be reduced so that students can remain in school ready to learn. Many schools, particularly Title 1 schools, struggle to maintain state-mandated attendance rates. School nurses may want to consider recommending mass influenza immunization programs to increase school attendance. It also is essential that school nurses keep data on how such immunization programs affect illness and attendance

rates. Such data validate the effectiveness that mass immunization clinics have on increasing attendance.

By reducing the incidence of influenza in the school setting, absentee rates can be reduced so that students can remain in school ready to learn.

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