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School-Located Influenza Vaccination Programs in the United States: A Review of the Medical Literature

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Introduction

- In the United States, annual influenza vaccination is recommended for all children 6 months through 18 years of age.¹
- Private practices and public clinics do not have the capacity to vaccinate a high proportion of children between the time that influenza vaccine becomes available and the peak of the influenza season.²
- Public health authorities are increasingly adopting school-located influenza vaccination (SLIV) programs as a cost-effective,³ efficient approach for reaching large numbers of children.

Objective

- To conduct a review of the available medical literature to summarize the collective experience regarding recent U.S. SLIV programs for the benefit of future programs

Methods

- The National Library of Medicine PubMed system and Medical Intelligence Solutions' Knowledge Discovery Platform (New York, NY) were searched for medical journal articles and conference abstracts, respectively.
- Search terms were *influenza* AND [*vaccination* OR *immunization*] AND *school*.
- All publications from January 2000–May 2010 were included in the search; 39 articles and 524 abstracts were initially identified; conference posters and slide presentations posted online were reviewed.
- Publications that provided quantitative data regarding US SLIV programs were selected for this review.

Results

- Published reports or abstracts for 36 SLIV programs (20 seasonal, 13 H1N1, and 3 combined seasonal and H1N1) were identified, some of which spanned multiple years.⁴⁻⁴⁰
- The number of SLIV programs was highest for kindergarten through grade 12 (K–12), followed by elementary school (Figure 1).

- Many early SLIV programs were formal studies or pilot programs conducted with manufacturer support; however, since 2006, with one exception, programs have taken place without manufacturer assistance.
- Most school programs offered live attenuated influenza vaccine (LAIV) only (Figure 2).
- Programs vaccinated from 70 to 128,228 students; where reported (n=24), coverage ranged from 5% to 73% (Figure 3).
- 15 programs vaccinated ≥40% of students, 7 vaccinated 20%–39% of students, and 2 vaccinated <20% of students.
- The largest seasonal influenza vaccination program reported was conducted by the Hawaii Department of Health (n=63,153).⁴
- In response to the H1N1 pandemic, New York City reported the largest number of students vaccinated in SLIV programs (n=128,228).⁵
- Among children recommended to receive a second dose, 53%–95% of these children actually received the second dose (Figure 4).
- Among programs reporting coverage by age or grade, coverage was consistently higher among elementary students and lower in high school students (Figure 5).
- Where reported, classroom disruption was generally described as minimal. In Hawaii, the median time for a child to be vaccinated was 4 minutes, and 90% of children spent <10 minutes in the clinic.⁴ During the H1N1 SLIV programs in San Diego, students missed <20 minutes of class time.⁷
- Faculty and staff were immunized in some programs; where reported (n=8), 5–21 teachers were vaccinated for every 100 students vaccinated (Figure 6).
- Most SLIV programs vaccinated children without charge; many health departments were able to provide free vaccination to all children during their H1N1 campaigns because of federal funding.^{5,8,9}
- Costs for seasonal SLIV programs, where reported (n=5), ranged from approximately \$20–\$27 per dose delivered, including vaccine and administration costs.

Figure 1. Number of School-Located Vaccination Programs

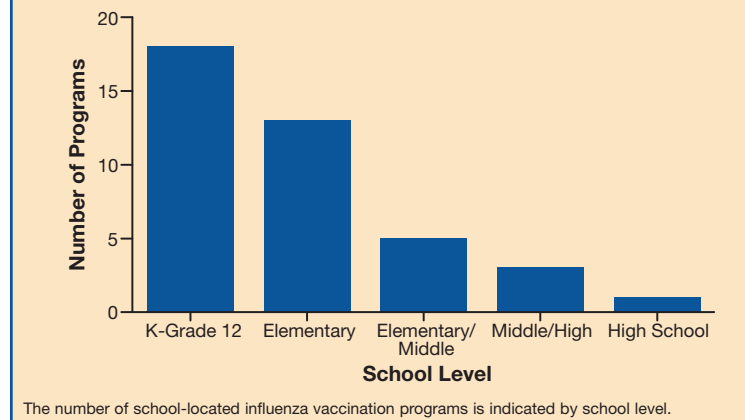


Figure 2. Vaccine Types Available in Vaccination Programs

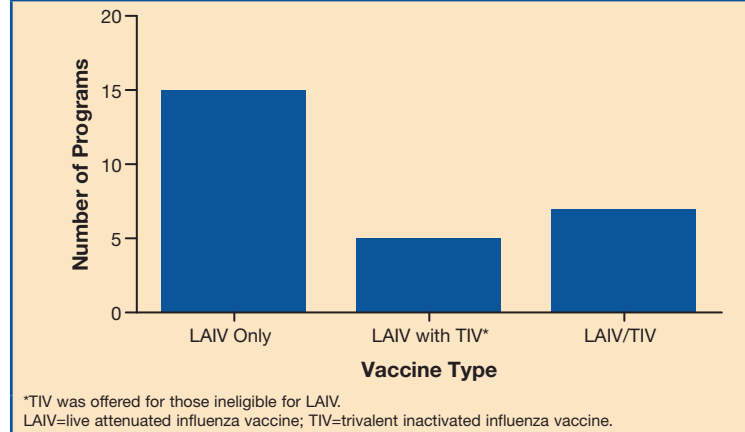


Figure 3. Proportion of Children Vaccinated in School-Located Programs

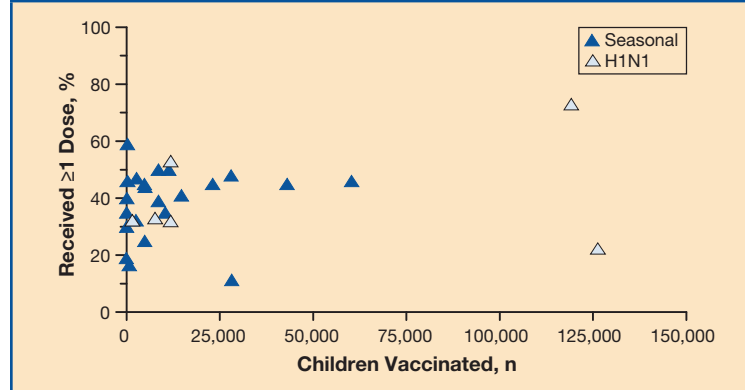


Figure 4. Proportion of Children Who Received ≥2 Doses of Vaccine

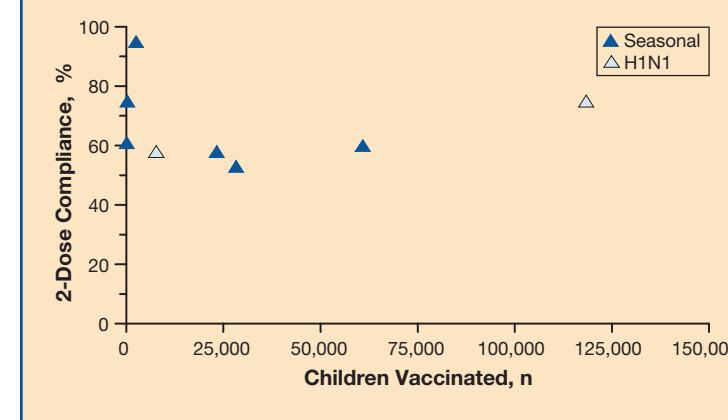


Figure 5. Proportion of Children Who Received >1 Dose of Vaccine by School Level

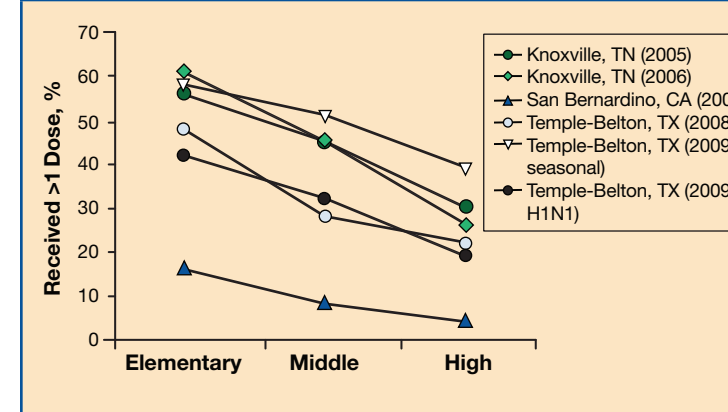
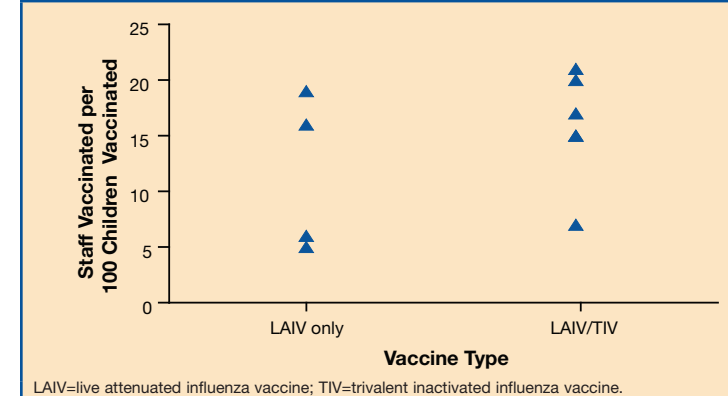


Figure 6. Number of Staff Vaccinated per 100 Children Vaccinated



Conclusions

- In the US, successful SLIV programs have been conducted in individual schools, school districts, and statewide, often vaccinating 40%–50% of students.
- SLIV programs may be less costly than vaccinating children elsewhere.
- A national, financially sustainable model would support future development of SLIV programs.

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