

RESEARCH ARTICLE

Early Lessons Learned From Extramural School Programs That Offer HPV Vaccine

KIM A. HAYES, MPH^a PAMELA ENTZEL, JD, MPH^b WENDY BERGER, MPH^c RACHEL N. CASKEY, MD, MPP^d JUDITH C. SHLAY, MD, MSPH^e
BRENDA W. STUBBS, BA^f JENNIFER S. SMITH, PhD^g NOEL T. BREWER, PhD^h

ABSTRACT

BACKGROUND: There has been little evaluation of school-located vaccination programs that offer human papillomavirus (HPV) vaccine in US schools without health centers (ie, extramural programs). This article summarizes lessons learned from such programs.

METHODS: In July to August 2010, 5 programs were identified. Semistructured, in-depth telephone interviews were conducted with program representatives about practical aspects of planning and implementation, including configuration and effectiveness.

RESULTS: Most programs offered HPV vaccine as part of a broader effort to increase uptake of adolescent vaccines. Respondents stressed the importance of building partnerships with local school systems throughout all aspects of the planning and implementation phases. All programs offered HPV vaccine at no cost to students. Most did not have a mechanism to bill private insurance, and some found Medicaid reimbursements to be a challenge. Programs achieved modest rates of initiation of the 3-dose HPV vaccine series (median 10%); however, among those who initiated the series, completion rates were high (median 78%). HPV vaccine uptake was lowest for a program that offered only HPV vaccine.

CONCLUSIONS: Extramural programs may increase uptake of vaccines and decrease absenteeism due to noncompliance with vaccine requirements for school entry. Until extramural programs in the US receive better access to billing private insurers and Medicaid, sustainability of these programs relies on grant funding. Better integration of extramural school-located vaccine programs with existing local healthcare and other programs at schools is an area for growth.

Keywords: child and adolescent health; public health; organization and administration of school health programs.

Citation: Hayes KA, Entzel P, Berger W, Caskey RN, Shlay JC, Stubbs BW, Smith JS, Brewer NT. Early lessons learned from extramural school programs that offer HPV vaccine. *J Sch Health*. 2013; 83: 119-126.

Received on August 24, 2011

Accepted on April 21, 2012

Each year in the United States, about 12,000 women receive a diagnosis of invasive cervical cancer,¹ which is especially concerning as cervical cancer is largely preventable through timely screening, treatment, and vaccination.² Human papillomavirus (HPV) vaccine has the potential to prevent 70% of cervical cancers.³ National guidelines recommend HPV vaccine for adolescents ages 11-12 and catch-up vaccinations up to age 26.⁴ However, only 44% of girls ages 13-17 in the United States have initiated HPV vaccine and fewer have completed the 3-dose series (27%).⁵

As adolescents visit medical providers less frequently than younger children,⁶⁻⁹ experts have identified school-located provision of adolescent vaccines as a strategy to increase uptake.^{7,8} One option

is to use existing school health centers, most of which already provide immunizations through their existing infrastructure.⁶ However, only about 6% of school districts in the US have at least 1 school health center.¹⁰

Another option is to create extramural programs that bring the needed resources into schools, thus establishing the potential to reach the vast majority of schools that do not have health centers. The United Kingdom, Canada, and Australia have extramural HPV vaccination programs, one of several reasons they have achieved higher rates of HPV vaccine uptake than the United States.¹¹ A Canadian program achieved 65% HPV vaccine initiation for 11-year-old female students in the first year.¹² Uptake rates in the

^aPublic Health Analyst, (khayes@rti.org), Primary Prevention Research and Evaluation Program, RTI International, 3040 Cornwallis Road, Research Triangle Park, NC 27709.

^bProject Manager, (pamelaentzel@gmail.com), VHA National Center for Health Promotion and Disease Prevention, 3022 Croasdaile Drive, Suite 200, Durham, NC 27705.

^cResearch Analyst, (wberger@ph.lacounty.gov), Communicable Disease Control Program, Los Angeles County Department of Public Health, 3530 Wilshire Blvd, Suite 700, Los Angeles, CA 90010.

United Kingdom and Australia were even higher in some areas (79-89%).^{11,13-16}

In the United States, voluntary school-located vaccination programs have successfully increased uptake of hepatitis B¹⁷⁻¹⁹ and influenza vaccines.²⁰ However, we are unaware of any published studies that have examined extramural vaccination programs that offer HPV vaccine. This article describes the planning and implementation of such programs to identify best practices and lessons learned.

METHODS

Participants

To identify a geographically diverse sample of extramural HPV vaccination programs, project staff conducted an internet search using Google (search terms: "HPV campaign," "pre-teen vaccination," "HPV campaign and schools," "HPV vaccination and schools," "pre-teen vaccination and schools," "HPV campaign and health department," "HPV vaccination and health department"), asked colleagues for referrals, made inquiries at a national conference on school-located vaccination, and asked programs that were interviewed. Ultimately, we identified 4 programs through the Internet search and 1 program at a conference. Project staff sent an initial e-mail to program representatives that explained the purpose of the project, and followed up with each representative by phone to seek participation.

Instruments

Project staff collected data using a brief pre-interview online survey and a semistructured telephone interview. The pre-interview survey focused on program characteristics, such as vaccines offered, number and demographics of students served, and number of HPV vaccine doses administered. The telephone interview focused on program configuration and logistics of planning and implementing extramural programs that offer HPV vaccine. The instruments are available online at <http://www.unc.edu/~ntbrewer/hpv.htm>.

Procedure

In July and August 2010, 1 interviewer conducted interviews with program representatives from the 5 vaccination programs. She audio-recorded the interviews (except 1 due to equipment malfunction) and transcribed them for content by interview guide. Before each telephone interview, program representatives completed the pre-interview survey. She also collected supporting program documentation, such as planning documents or evaluation reports, from 4 programs that had them available.

Data Analysis

One coder manually analyzed qualitative data by construct (ie, interview guide) using open and selective coding. As needed, she clarified program details with respondents. Program contacts reviewed the results and discussion to verify interpretations. They discussed some small concerns with the coder; however, they expressed no major dissenting opinions. For quantitative responses, the median and range is reported in text and complete data are available in Table 1.

RESULTS

Program Characteristics

Programs were located across the United States in Los Angeles, CA; Denver, CO; Chicago, IL; Guilford County, NC; and Spartanburg County, SC. Respondents were program administrators (CO, IL, NC, SC) and representatives from a local immunization coalition (CA) (median 18 years in current role). They represented local health departments (NC, SC), a local immunization coalition (CA), a public research university (IL), and a local healthcare system (CO). Four programs were implemented over the course of the school year, and 1 program was implemented in 1 week, with monthly follow-up visits. At the time of interview, 3 programs had been implemented and did not have ongoing efforts, 1 program had been implemented and was continuing during the 2010-2011 school year, and 1 program would begin implementation during the 2010-2011 school year.

^dAssistant Professor, (rcaskey@uic.edu) Internal Medicine and Pediatrics, School of Public Health and Cancer Center, University of Illinois at Chicago, 840 South Wood Street, M/C 856, Chicago, IL 60612.

^eDirector of Immunization/Travel Clinic, (jshlay@dhha.org), Denver Health and Hospital Authority, Denver Public Health, 605 Bannock Street, MC 2600, Denver, CO 80204.

^fHealth Educator, (brenda_stubbs@hotmail.com), Immunization Unit, Guilford County Department of Health, 1203 Maple Street, 3rd Floor, Greensboro, NC 27405.

^gResearch Associate Professor, (JenniferS@unc.edu), Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina, 2103 McGavran-Greenberg Hall, Chapel Hill, NC 27599.

^hAssociate Professor, (ntb1@unc.edu), Department of Health Behavior Health Education, Gillings School of Global Public Health, University of North Carolina, 325 Rosenau Hall, CB7440, Chapel Hill, NC 27599.

Address correspondence to: Noel T. Brewer, Associate Professor, (ntb1@unc.edu), Department of Health Behavior Health Education, Gillings School of Global Public Health, University of North Carolina, 325 Rosenau Hall, CB7440, Chapel Hill, NC 27599.

Supported in part by an unrestricted educational grant from GlaxoSmithKline. The opinions expressed in this paper are those of the authors and do not necessarily represent those of GlaxoSmithKline. Additional support provided by the American Cancer Society (MSRG-06-259-01-CPPB).

Table 1. Characteristics of Extramural School-Located Vaccination Programs That Offer HPV Vaccine

Characteristics of Programs	Guilford Co., NC	Spartanburg Co., SC		Los Angeles, CA	Denver, CO	Chicago, IL
Vaccination focus of program	HPV vaccine	Adolescent immunizations		Adolescent immunizations	Adolescent immunizations	Adolescent immunizations
Offered other vaccines	No	Yes		Yes	Yes	Yes
Tetanus-diphtheria-acellular pertussis (Tdap)	No	Yes		Yes	Yes	Yes
Tetanus and diphtheria toxoid (Td) booster	No	No		Yes	Yes	No
Meningococcal vaccine (MCV4 or MPSV4)	No	Yes		Yes	Yes	Yes
Seasonal influenza shot (TIV vaccine) or the nasal vaccine (LAV)	No	Yes		Yes	Yes	Yes
H1N1 influenza	No	No		No	Yes	Yes
Other	No	No		MMR, HAV, HBV, IPV	All catch-up vaccines	All catch-up vaccines
Duration of program	2 years	2 years		1 week	3 years	—
Status as of summer 2010	Implemented	Implemented		Implemented	Implemented and ongoing	Beginning implementation
HPV vaccine target population						
Gender	Female	Female		Female	Female	Female and male
Grade	6, 7, 8	6		7, 8	6, 7, 8	5, 8, catch up for any
Insurance status	All	Underinsured		All	All	All
Reimbursement and cost						
Stocked VFC vaccines	Yes	Yes		Yes	Yes	Yes
Billed private insurance	Yes	No		No	Yes	No
Costs to students	No	No		No	No	No
Sliding scale fees	No	No		No	No	No
Clinic configuration						
School where vaccine was provided	Core schools*	Program school		Program school	Program school	Program school
Time of school day	After	Before, during, after		During	During	Before, during, after
Number of days on site	3	3		3	3	3
Makeup days	At some schools	No		No	Once a month	No
Parent presence required	All 3 doses	First dose only		No	No	No
Staff who delivered vaccines	HD nurses	HD nurses	HD nurses	School nurses	Denver Health nurses	Mass immunizer
Used vaccine registry	Yes	Yes	Yes	Yes	Yes	No
Program reach		Year 1	Year 2	Year 1	Year 1	
Number of participating schools	6	2	9	1	7	—
Potential number students served [†]	7991	50	266	~1100	1434	—
Number of HPV vaccine 1st doses	189	9	52	66	144	—
Initiation rate of HPV vaccine	2%	18%	19%	6%	10%	—
2nd and 3rd doses offered	Yes	Yes	Yes	No	Second only [‡]	—
Number of HPV 3rd doses	148	7	50	—	—	—
Completion rate of HPV vaccine	78%	78%	96%	NA	—	—
Evaluation						
Process data available	Yes	Yes	Yes	No	Yes	To be collected
Outcome data available	Yes	Yes	Yes	Yes	Yes	To be collected
Plan to disseminate results	Yes	No	No	No	Yes	Yes

HD, Health Department.

*Students from satellite schools traveled to core schools.

[†]These numbers may overstate the number of adolescent females served, because they may include adolescent females who received HPV vaccine outside of the program.

[‡]Program timeline did not leave enough time for third dose to be delivered. Percentage of students who received second dose if received first dose at school = 120/144 = 83.3%.

Four programs were grant-funded and 1 program operated on funds from a local immunization coalition.

Two programs began with the purpose of increasing uptake of recommended adolescent vaccines, including tetanus-diphtheria-acellular pertussis (Tdap) vaccine, meningococcal vaccine, and HPV vaccine (Table 1). Three programs began with the goal of increasing HPV vaccination, but 2 decided during the planning phase that it would be more effective and acceptable to emphasize all adolescent vaccines and avoid focusing on HPV vaccine.

The program that offered only HPV vaccine stressed that “if [they] could do it over again [they] would change the focus from HPV only to all adolescent vaccines” to increase acceptability among schools and achieve higher participation rates. This program was also unique in that it was implemented in 2 phases. Phase 1 (year 1) involved education about HPV and HPV vaccine, and phase 2 (year 2) involved vaccinations in schools. All programs included educational efforts targeting parents. Some programs also targeted students, community members, school administrators, teachers, other school staff, and healthcare providers (Table 2).

Aside from 2 programs that received funding from the same foundation, none of the programs were aware of any other extramural school-located HPV vaccination efforts. No programs identified other HPV vaccine education efforts in their local communities.

Four programs offered HPV vaccine to females only. The program that would begin implementation in the 2010-2011 academic school year planned to make HPV vaccine available also to males. Programs offered HPV vaccine to adolescents in grades 5, 6, 7, or 8. One program targeted fifth-grade students for HPV education only and offered HPV vaccine to sixth-grade students.

Programs targeted a median of 6 schools (range 1-9). Four programs offered HPV vaccine only to students in the participating program schools; 1 program offered HPV vaccine to all schools in the county. One program focused vaccination efforts only on underinsured students, while the other 4 programs offered services to students who fell into 1 or more of these insurance statuses: uninsured, underinsured, Medicaid eligible, or privately insured.

Program Implementation

All programs sent consent forms and information about vaccines offered by the program to parents through student backpack mailings. They instructed students to return the forms to teachers, school nurses, or program staff. Three programs had staff attend school events where parents were present as one strategy to increase consent rates. For example, CO staff attended registration events to obtain consent

directly from parents. “It was helpful to be able to talk to parents directly because they could get any questions they had answered right then.” Programs reminded parents about clinics through automated voicemails from the school to the family’s home, school newsletters, or reminder postcards. Three programs also provided letters home to parents who missed a dose of HPV vaccine.

All programs scheduled their clinics according to the recommended HPV vaccine administration schedule. Programs also made efforts to schedule vaccination clinics on days when parents were already expected to be present at the school as a way to promote the program. “It’s influential if you see your neighbors are lined up. You think ‘maybe that’s important.’” Illinois scheduled their second vaccination clinic on a day when parents were required to sign for their child’s report card at school. South Carolina held vaccination clinics on parent-teacher meeting days or during back-to-school festivals.

Two programs vaccinated before, during, and after school; 2 programs vaccinated only during school hours; and 1 program vaccinated only after school. Three programs did not require parents to be present for vaccine administration. One program required a parent to be present for administration of each dose of HPV vaccine, and 1 program required a parent to be present for the first dose only. In both cases, the local school system required this to be in implementation protocol. Programs that required parents to be present for the administration of their daughters’ HPV vaccine allowed parents to bring their consent forms at the time of vaccination.

Clinic configuration varied among and within programs, depending on the needs and wishes of individual schools. Programs allowed schools to decide the location of the vaccination clinic. For example, California held its vaccination clinic in the school’s courtyard. South Carolina held clinics in 7 schools and reported that some schools preferred the gymnasium and some preferred the school’s library for clinic sites. Programs also allowed schools to coordinate the flow of students to clinics. For example, Illinois employed mass immunizers to provide the vaccines, but school nurses coordinated the flow of students from classrooms to the clinic site.

Respondents emphasized that, as schools were “in the business of educating kids,” they sought to minimize burden on the host schools by ensuring that school staff had as little to do with the immunization efforts as possible. For example, California made sure that the school nurse did not feel burdened to collect consent forms from students. The program distributed consents to parents through a backpack mailing, and students returned the forms to a designated box in the nurse’s office. Program staff then came by to collect the consents. They also made every effort to be available

Table 2. Audiences Targeted for HPV Vaccine Education

	Guilford Co., NC	Spartanburg Co., SC	Los Angeles, CA	Denver, CO	Chicago, IL
Adolescent students	•		•	•	•
Parents	•	•	•	•	•
Community members	•	•			•
School administrators	•	•			•
Teachers	•				•
Other school staff	• (Nurses)				•
Healthcare providers	•				•

to answer questions the school nurse had about the program. “We really wanted to make sure that nurses felt supported and felt that their help was important to the success of our program.” Similarly, Colorado set up a consent system whereby teachers delivered consent forms to the school nurse who then mailed them to program staff using prepaid FedEx envelopes.

Four programs used nurses employed by the program agency to vaccinate students; 1 program employed mass immunizers hired from a private organization that provides nurses to vaccinate large numbers at once. Programs followed similar procedures for vaccine delivery: program staff confirmed receipt of the consent form before vaccination, delivered the vaccine, recorded the vaccine in internal electronic records, and provided students with a written record of vaccinations given. All programs were in states with immunization registries that were available for use but whose use was not mandatory. Four programs used the registries to verify that students had not already received HPV vaccine.

Systems for Recouping Costs

All programs provided HPV vaccine free of out-of-pocket costs, such as administration fees or copays. Some school partners felt strongly that programs should not charge students for vaccination, but respondents noted the lack of long-term sustainability of this approach.

All programs provided vaccines paid for by the federal Vaccines for Children (VFC) program. However, programs experienced different access to state programs that disseminate VFC vaccines, depending on the type of lead agency and the state in which they were located. For example, South Carolina could use the Vaccine Assurance for All Children program to offer HPV vaccine to students under age 18 if they were covered by Medicaid, uninsured or American Indian/Alaska Native. A South Carolina-specific program also provided underinsured children with HPV vaccine through their State Department of Health. Because the lead agency was a local health department, they were able to use this program to offer HPV vaccine to underinsured children not covered by the Vaccine Assurance for All Children program. Only

2 programs also delivered privately purchased HPV vaccine.

Unless the programs’ lead agencies had existing systems for billing Medicaid and third-party insurance, they did not have the means to recover costs of administering the HPV vaccine. The programs in North Carolina and South Carolina were led by local health departments that had existing mechanisms for billing Medicaid, thus they were able to seek reimbursement. The local health department in North Carolina also accepted some private insurance, allowing this program to bill private insurers as well. Only one other program billed private insurance.

Even programs with mechanisms for billing faced barriers to reimbursement. In some cases, Colorado could not receive Medicaid reimbursement as they needed permission from students’ Medicaid providers that at times did not grant permission. Another program that found seeking reimbursement for the administration fee for Medicaid-enrolled students cost more than the amount of the reimbursement decided to absorb the administration costs rather than bill Medicaid. Colorado received its grant from the Centers for Disease Control and Prevention to evaluate the feasibility of providing vaccination services in schools and billing for the services provided.

Lessons Learned About Partnerships

Respondents emphasized that partnering with and engaging schools “was an unexpectedly complex and lengthy process”—but that it is vitally important to the success of their vaccination programs. Local school systems often had specific top-down processes that programs had to adhere in order to obtain permission to contact schools. Respondents stressed the importance of open, honest communication with school systems throughout the partnership. Each program reported that they presented their program ideas to school representatives at all levels in an open and collaborative manner.

Programs differed on when they sought partnership with the local school systems. CO received support from their local school system before applying for their grant to plan and implement their school-located vaccination program. In contrast, Illinois,

North Carolina, and South Carolina officially partnered with schools after receiving grant funds. North Carolina program staff reflected that their decision to seek support after securing funding was problematic. “[We] lost so much time up front. It took us about 6 months just to get permission from the school district to contact individual schools.” First, program staff met with a member of the school health advisory council to request a place on their meeting agenda. A school official had to recommend the program to the board of education and the board had to approve it, before program staff could present the project to faculty, staff and parents at individual schools. Both the North Carolina and South Carolina programs recommended securing the support of local school systems prior to applying for grant funds to run school-located vaccination programs.

A common strategy for connecting with schools was to use existing relationships between the lead agencies and the school systems. For example, the 2 programs run by local health departments used their school system liaison to connect with district level administrators. South Carolina worked through the health director to talk with local superintendents. California worked within its local immunization coalition structure, which included a representative from the local school district, to identify 1 middle school to target.

Illinois did not have a formal connection to the local school system, and as a result they adopted a “very grassroots” approach to connect with district-level administrative personnel in charge of health care in schools. “We were on the phones a lot making calls to [school] administrators trying to set up meetings or going to their offices to try to get some face time.” Program staff said getting their foot in the door was the hardest part. Once school administrators understood the goals of the program—to promote adolescent immunizations—they were supportive. “We made sure to be clear that healthy kids means the schools can do their job better.”

Respondents reported that program success depended largely on the schools’ engagement with the goals of the program and their willingness to participate. Respondents described relationships with principals and school staff members (ie, teachers, school nurses) as especially important to establish, as the principals and school staff controlled programs’ access to students and their parents. For example, in one program, 2 schools that initially agreed to send home the information packets to parents subsequently refused to do so. Instead, they told parents about the program through school newsletters and asked parents to call the school to request a consent form. Program staff indicated that this substantially lowered

Table 3. Summary of Key Findings

Opportunities and Challenges	Supporting Details
School-located vaccination programs have substantial capacity	<ul style="list-style-type: none"> • Programs successfully provided the full 3-dose vaccine series to students who utilized the programs, despite low initiation rates • HPV vaccine administration schedule can work within broader school-located adolescent immunization promotions
Existing programs are not sustainable	<ul style="list-style-type: none"> • Grants provide time-limited funding • Few existing mechanisms to bill insurance • Programs provide vaccines free of charge, thereby increasing the financial burden to the program
Building collaborative partnerships with schools is an ongoing, vital process	<ul style="list-style-type: none"> • Seeking partnerships with local school systems before seeking program funding is crucial • Minimizing burden on the school during implementation is key
Further research and collaboration between programs is needed	<ul style="list-style-type: none"> • Programs are uncommon and isolated from other extramural programs

the number of families who were aware of and who made use of the program.

School staff support and cooperation was also critical to gaining access to school-based immunization records. For example, because the lead agency in Colorado was external to the school system, the Family Educational Rights and Privacy Act (FERPA) prevented program staff from accessing student immunization records on file at the schools, requiring program staff and school nurses to coordinate vaccination activities and tracking. However, programs that had staff affiliated with the local school systems did not face this issue. For example, a member of the California program staff held dual roles in the local immunization coalition and the local school system, and therefore had access to student immunization records.

Program Evaluation

Programs varied in the extent to which they evaluated their vaccination efforts. Four programs collected outcome data, such as number of students who received HPV vaccine; some programs also collected process data such as how many parents attended educational presentations (Table 3).

The median number of female students targeted in each program was 1100 (range 50-7991). Programs administered HPV vaccine to a median of 66 students (range 9-189). Median uptake of first HPV vaccine dose was 10% (range 2%-19%). Among students who received the first dose, a median of 78% (range 78%-96%) completed the 3-dose series. HPV vaccine

uptake was lowest for the program that only offered HPV vaccine (2% vs. 6%-19%).

DISCUSSION

A promising finding from this study is that extramural programs in the United States were successful at administering all 3 doses of HPV vaccine to adolescents who initiated the series in their programs, often despite substantial practical and administrative barriers. This finding demonstrates the capacity of school-located vaccination programs to administer the series of HPV vaccine to students in a school setting.

This success was offset somewhat by low rates of HPV vaccine initiation, which were lower than similar extramural programs in other countries. The US programs' initiation data do not include adolescents who may have already received HPV vaccine, as programs were able to access information only for students for whom they received consent. Thus, population-level initiation of HPV vaccine among students targeted by US programs is certainly much higher than the programs' median of 10%. In 2010, the approximate period of some of these programs, the National Immunization Survey-Teen (NIS-Teen) found that HPV vaccine initiation was 50%.⁵ Even after combining estimates from the programs and the NIS-Teen, the population-level uptake of HPV vaccine of around 60% would still be well below the rates of 80% and higher for similar programs in other countries. Higher HPV vaccine uptake rates in other countries may be due to greater funding, endorsement by the central government, better integration into a centralized healthcare system, and larger scale of implementation. Lower uptake in the United States could be due in part to initial controversy over mandatory vaccination for school entry. Vamos et al²¹ provide a comprehensive discussion of arguments for and against mandatory vaccination.

Building partnerships was a hallmark of these extramural HPV vaccination programs. They exercised great care to minimize burden on school staff. Building sustainable partnerships with local school systems that often have unique organizational infrastructures and processes for partnering with outside organizations was a time-intensive process, but one that programs felt was absolutely necessary for their success and sustainability.

Limitations

Project staff conducted a detailed search but may not have located all extramural programs that offer HPV vaccine. Although we conducted extensive internal tests of our instruments, we did not pilot test them so as not to deplete the pool of subjects (N=5). These programs were all grant funded and charged

no fees; thus, programs that charged administration fees or copays may see different results. Program representatives' insights into what might be more effective remain to be tested in future evaluation studies.

CONCLUSION

Strengths of this report include the timeliness of this information for public health practice, our extensive search for and comprehensive participation by the programs. No published studies, we are aware of, have described extramural vaccination programs that offer HPV vaccine in US schools.

As many adolescents visit their physicians infrequently, school-located efforts to vaccinate adolescents can be a valuable adjunct to traditional clinical care. Offering HPV vaccine in extramural school-located programs is a promising strategy to increase uptake of the vaccine in the United States. These programs are at the forefront of such efforts.

Until adequate mechanisms for billing private insurers and Medicaid are developed, school-located vaccination programs will continue to operate on grant funds, which will limit the sustainability of these programs. With the enactment of healthcare reform in the United States, insurance plans are now required to provide first dollar coverage for many vaccines including HPV vaccine. This change may create new opportunities for extramural vaccination programs.

IMPLICATIONS FOR SCHOOL HEALTH

Our findings suggest that substantial capacity exists to successfully offer the full 3 dose HPV vaccine series through extramural programs. The majority of programs we interviewed offered adolescent vaccines in addition to HPV vaccine, particularly vaccines required for school entry. Extramural programs have the opportunity to decrease absenteeism due to non-compliance with vaccine requirements for school entry by providing required vaccines to students on-site. Extramural programs could lessen the burden on school staff members who are responsible for ensuring compliance with required adolescent vaccines.

Human Subjects Approval Statement

The institutional review board at the University of North Carolina ruled the study exempt from review.

REFERENCES

1. US Cancer Statistics Working Group. 1999-2007 Cancer incidence and mortality Web-based report. United States Cancer Statistics, 2011. Available at: <http://apps.nccd.cdc.gov/uscs/>. Accessed July 22, 2011.

2. Villa LL, Costa RL, Petta CA, et al. High sustained efficacy of a prophylactic quadrivalent human papillomavirus types 6/11/16/18 L1 virus-like particle vaccine through 5 years of follow-up. *B J Cancer*. 2006;95:1459-1466.
3. Smith JS, Lindsay L, Hoots B, et al. Human papillomavirus type distribution in invasive cervical cancer and high-grade cervical lesions: a meta-analysis update. *Int J Cancer*. 2007;121(3):621-632.
4. Centers for Disease Control and Prevention. FDA licensure of bivalent human papillomavirus vaccine (HPV2, Cervarix) for use in females and updated HPV vaccination recommendations from the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly Rep*. 2010;59(20):626-629.
5. Centers for Disease Control and Prevention. National, state, and local area vaccination coverage among adolescents aged 13-17 years—United States, 2009. *MMWR Morb Mortal Wkly Rep*. 2010;59(32):1018-1023.
6. Daley MF, Curtis CR, Pyrzanowski J, et al. Adolescent immunization delivery in school-based health centers: a national survey. *J Adolesc Health*. 2009;45(5):445-452.
7. Humiston SG, Rosenthal SL. Challenges to vaccinating adolescents: vaccine implementation issues. *Pediatr Infect Dis J*. 2005;24(suppl 6):S134-S140.
8. Lindley MC, Boyer-Chu L, Fishbein DB, et al. The role of schools in strengthening delivery of new adolescent vaccinations. *Pediatrics*. 2008;121(suppl 1):S46-S54.
9. Robbins SC, Bernard D, McCaffery K, Skinner SR. 'It's a logistical nightmare!': recommendations for optimising human papillomavirus school-based vaccination experience. *Sex Health*. 2010;7(3):271-278.
10. Brener ND, Wheeler L, Wolfe LC, Vernon-Smile M, Caldart-Olson L. Health services: results from the School Health Policies and Programs Study 2006. *J Sch Health*. 2007;77(8):464-485.
11. Stretch R. Implementing a school-based HPV vaccination programme. *Nurs Times*. 2008;104(48):30-33.
12. Ogilvie G, Anderson M, Marra F, et al. A population-based evaluation of a publicly funded, school-based HPV vaccine program in British Columbia, Canada: parental factors associated with HPV vaccine receipt. *PLoS Med*. 2010;7(5):1-11.
13. Brotherton JM, Deeks SL, Campbell-Lloyd S, et al. Interim estimates of human papillomavirus vaccination coverage in the school-based program in Australia. *Commun Dis Intell*. 2008;32(4):457-461.
14. Brabin L, Roberts SA, Stretch R, et al. Uptake of first two doses of human papillomavirus vaccine by adolescent schoolgirls in Manchester: prospective cohort study. *Br Med J*. 2008;336(7652):1056-1058.
15. Reeve C, De La Rue S, Pashen D, Culpan M, Cheffins T. School-based vaccinations delivered by general practice in rural North Queensland: an evaluation of a new human papillomavirus vaccination program. *Commun Dis Intell*. 2008;32(1):94-98.
16. Watson M, Shaw D, Molchanoff L, McInnes C. Challenges, lessons learned and results following the implementation of a human papillomavirus school vaccination program in South Australia. *Aust N Z J Public Health*. 2009;33(4):365-370.
17. Centers for Disease Control and Prevention. Hepatitis B vaccination of adolescents - California, Louisiana, and Oregon, 1992-1994. *MMWR Morb Mortal Wkly Rep*. 1994;43(33):605-609.
18. Cassidy WM, Mahoney FJ. A hepatitis b vaccination program targeting adolescents. *J Adolesc Health*. 1995;17(4):244-247.
19. Harris PA, Kerr J, Steffen D. A state-based campaign: the New Mexico experience. *J Sch Health*. 1997;67(7):273-276.
20. Jenlink CH, Kuehnert P, Mazyck D. Influenza vaccinations, fall 2009: model school-located vaccination clinics. *J Sch Nurs*. 2010;26(suppl 4):7S-13S.
21. Vamos CA, McDermott RJ, Daley EM. The HPV vaccine: framing the arguments for and against mandatory vaccination of all middle school girls. *J Sch Health*. 2008;78(6):302-309.