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Descriptive Report

Increasing HPV Education and Vaccination of Preteens in a Medically Underserved Neighborhood

A Middle School-Based Approach

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Abstract

The United States of America is failing to achieve widespread human papillomavirus (HPV) vaccination coverage despite evidence that shows the vaccine can prevent HPV related disease, including greater than 80 percent of cervical cancers. Internationally, school based vaccination programs have proven to lead to the highest vaccination rates. In an effort to increase rates in one of Arkansas's most underserved communities, the University of Arkansas for Medical Sciences 12th Street Health and Wellness Center formed a partnership with the Little Rock School District to provide the Gardasil 9 vaccination series to 11-12-year-old students free of charge in their middle school. Student-run free health clinics can help increase local HPV vaccination rates by utilizing existing government resources to provide free vaccines to medically underserved children. Our goal in publishing this report is to provide the steps necessary to design and implement similar school-based vaccination programs to replicate this partnership across the nation.

Introduction

The human papillomavirus (HPV) vaccine is recommended for girls and boys at age 11 or 12 as 2 doses given 6 months apart or 3 doses over 6 months if age 15-26.[1] It is important to receive the vaccine early, so the immune system can develop protection before sexual activity begins. Approximately 80% of teens or pre-teens acquire HPV within three years of engaging in sexual activity.[2] In a survey among high school students in Arkansas, 50.3% have had sexual intercourse, with 55.1% of those sexually active reporting not using a condom during their last sexual encounter.[3] The vaccine protects against anogenital warts, anogenital cancer, head and neck cancer, and cervical cancer, preventing up to 81% of cervical cancers with the 9vHPV (Gardasil 9) vaccine.[4-6] HPV vaccines were introduced to the public 10 years ago with Gardasil and Cervavix, which offered protection against the 2 most common oncogenic HPV types: 16 and 18. Gardasil 9, approved by the US Food and Drug Administration in 2014, expanded the coverage to 5 other types (Table 1).

Arkansas has among the lowest HPV vaccination series completion rates in the nation — 23.4% and 11.4% of girls and boys, respectively, compared to 39.7% and 21.6% for the United States (US) in 2014 (Table 2).[7] Low HPV vaccination rates are not an issue unique to Arkansas, as all states' coverage rates are well below the Healthy People 2020 target of 80% series completion by 2020.[8]

Review of the 2014 Center for Disease Control (CDC) National Immunization Survey-Teen data demonstrates improvement is needed in both vaccine initiation and completion. Globally, free school-based programs have achieved the best results. Australia instituted a national, government-funded, school-based HPV vaccination program in 2007 and now has coverage >70% for all 3 doses for 12-13-year-olds. Australia is already seeing clinical effects with a reduction in high-grade cervical lesions and genital warts.[9] In the United States, Rhode Island is currently leading with greater than 70% initiation after offering the vaccine in

Table 1. Burden of disease attributed to HPV types covered by the Gardasil and Gardasil 9 vaccine[4]

	HPV Type		Cervical Cancer	All HPV-Associated Cancers	Anogenital Warts	
Gardasil	6	11			**90%**	Gardasil 9
	16	18	**66%**	**64%**		
	31	33	**15%**	**10%**		
	45	52				
	58					

Table 2. Percentage of HPV vaccination rates categorized by dose and sex in the United States and Arkansas via National Immunization Survey-Teen 2014[7]

	Female			Male		
	≥1 Dose	≥2 Dose	≥3 Dose	≥1 Dose	≥2 Dose	≥3 Dose
Arkansas	54.6	37.8	**23.4**	35.1	21.8	**11.4**
US	60.0	50.3	**39.7**	41.7	31.4	**21.6**

schools and mandating the series for all 7th graders.[10] For the states that do not have a school mandate, HPV vaccine initiation has been well studied with potential barriers including perceived effectiveness and harm of the vaccine, perceived increased risk in sexual behavior, cost, and access.[11-16]

This information motivated a group of students to create a partnership between the Little Rock School District and the University of Arkansas for Medical Sciences 12th Street Health & Wellness Center (HWC), a student-run free health clinic, to eliminate cost and access barriers by developing a school-based approach. Through the CDC's Vaccines for Children (VFC) Program, children who are insured through the state's Medicaid program or have no insurance are provided the vaccine at no cost. By providing vaccinations at school and at no cost, parents are relieved of the burden of transportation, cost, or scheduling in deciding to vaccinate their child with the complete HPV series. The goal of this approach is to increase HPV vaccination coverage in one of Little Rock's most underserved neighborhoods, Central Little Rock Promise Neighborhood.

Getting Started

Meet with School District Health Coordinator

The middle school vaccination approach is predicated on a partnership between a clinic and its surrounding schools. The first step in forming this relationship is identifying the local school district health coordinator and arranging a meeting to propose the partnership. The meeting should cover current vaccination rates, any efforts to increase rates, school board and parental opinion on vaccinations, in our case specifically the HPV vaccine, and which schools would most benefit based on highest percentage of students with Medicaid or no health insurance. The HPV vaccine is not mandated for students in Arkansas, like 47 other states in the US; however, the Little Rock school district's desire was to improve the health of their own students and thus gave approval to proceed with an official proposal.[17]

Create and Submit Project Proposal

Because there are several parties involved, the logistics of eligibility, funding, staffing, and safety measures need to be addressed in a written document. This document can then be used to disseminate the project idea. Registration forms, informed consent and assent forms, flyers, and surveys should be submitted with the proposal for review (our registration and consent form and survey are available in English and Spanish in Online Appendix 1). The health coordinator can forward the proposal to the necessary school district authorities to sanction the project.

All male and female students at the school over the age of 11 who had not previously received all

doses of the HPV vaccine are eligible to participate. After parents returned signed consent forms, information from the program registration form including name, date of birth, and address is used to identify students to access and review immunization records through the state immunization registry. For example, if a child is found to have already received the first dose of the HPV vaccine, this dose will not be repeated but the 2nd (and 3rd dose if >15-years-old) will be given to complete the vaccine series. The program is designed with 3 immunization days, so students who initiate the series with the program complete it within the current school year. If a student has already received doses of the vaccine, the next dose is given at the earliest eligible date of the 3 immunization days. The 12th Street HWC used the VFC Program to supply Gardasil 9 at no cost to children with Medicaid or no health insurance (information to become a VFC provider can be found on the CDC website). Children listed as having private insurance on their registration form received vaccines funded by the clinic's private stock. This stock, in addition to supplies (~$2 per shot given) and printing costs (~$400 for all forms), is purchased from the clinic's operating budget. The health care staff administering the vaccine include a pharmacist, fourth year pharmacy students who have received the American Pharmacists Association certification to perform vaccinations, and the school nurse. The pharmacist overseeing the vaccine administration has an emergency protocol with supplies available for treatment of a severe allergic reaction including EpiPen (intramuscular epinephrine), Benadryl (diphenhyrdamine oral and injectable) and a blood pressure cuff.

Meet with School Principal/School Nurse

Once the school district has approved the project, attention is turned to the individual school(s). A meeting with the principal and school nurse provides an opportunity to review the program and tailor it the school's population. Topics of discussion should include methods of promoting and enrolling students in the program, logistics of vaccination day, and thoughts on an education presentation for students. Using the standard school year calendar, there are 4 possible tracks to initiate and complete 2-3 doses of the vaccine in the same year (Figure 1) depending on the student's age. The 2-3 immunization days can be chosen within a track after coordinating the school calendar with immunization volunteer availability.

Promote and Enroll Students in Program

Ideally parents can enroll their student after discussing the program in person, such as during school registration, parent-teacher conferences, or sporting events. The forms could also be sent home from school with reminders by phone message blasts to return the forms by a selected date. The signed parental consent forms, which give permission for all doses, are collected by the school nurse.

Vaccinate

Prior to vaccination day, the state immunization database is reviewed to decide which students are eligible to receive a vaccine. The immunization staff arrives to set up vaccinations and supplies, including an emergency kit. The school nurse is in charge of getting students from their classroom. Staff volunteers help students fill out assent forms. Pharmacy students deliver the vaccine and fill out the vaccination form under supervision of a licensed pharmacist. Students are observed for adverse reactions for 15 minutes before returning to their classroom. The vaccination forms are used to update the state immunization database and updated records are printed for the parents.

Educate

We conduct an education component on puberty, sexually transmitted infections (STI), including HPV, and preventative measures (Online Appendix 2). This was open to all students, but it required parental consent as it was not part of the school curriculum. Meeting with the middle school health teacher guided our presentation and reminded us to ensure materials were written at an appropriate literacy level, scare tactics including pictures of the disease process were excluded, and time for questions was incorporated. The school opted to separate the genders for the presentation, which helped students feel more comfortable asking about normal physiologic processes and STIs.

Results

In the first year, our program had 27 participants. Of those, 18 received their first dose and 9 completed the 3 dose series. The series completion rate is lower than anticipated because some students returned their consent form after the first vaccination day had occurred, others were absent on one of the vaccination days, and some students declined the vaccine at time of administration. All

Figure 1. Proposed tracks (A-D) allowing vaccine series (either 2 or 3 doses depending on student's age) to be completed in one academic year

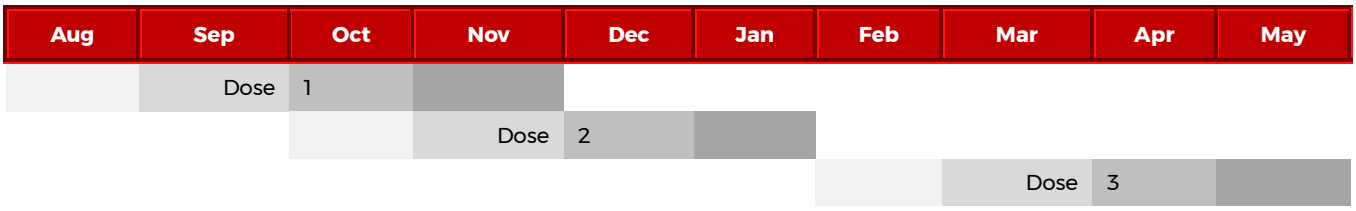
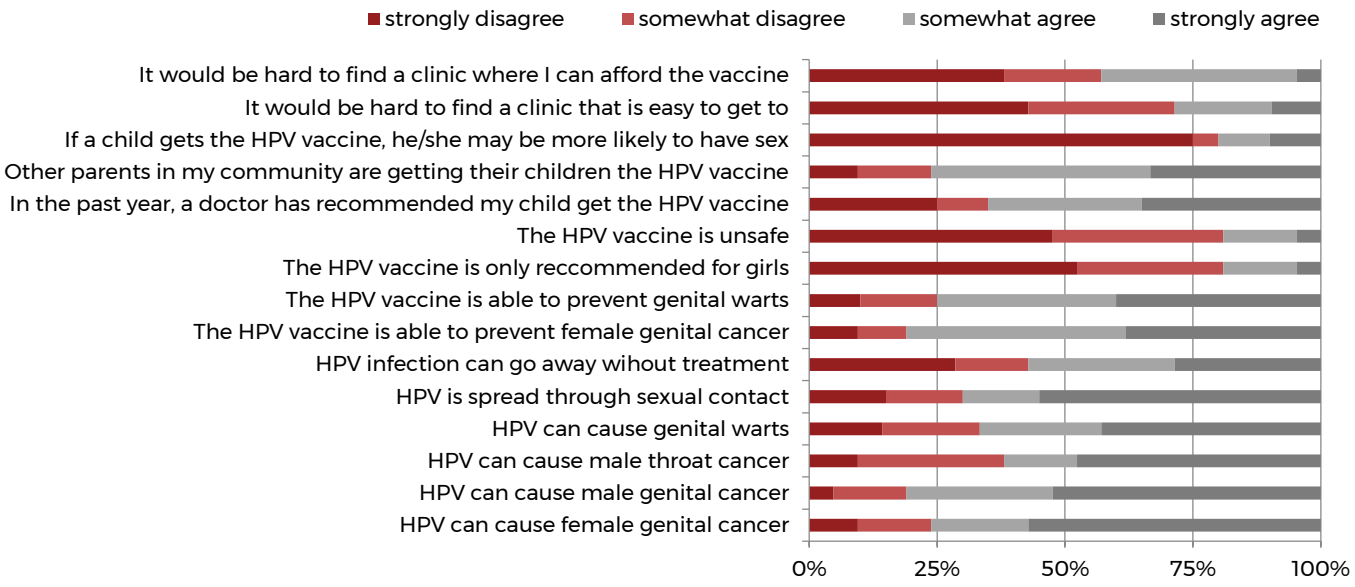


Figure 2. Survey of parents of students enrolled in the vaccination program evaluating HPV knowledge, opinions, and barriers to vaccination (n=21)



students who did not complete the series this year will be instructed to visit the 12th Street HWC when their next dose is due over the summer

In total, we delivered 40 HPV vaccines. At the school, a student who has to leave campus to receive a vaccine misses on average 4 hours of the school day. Our students averaged less than 30 minutes outside the classroom during our program, saving an estimated 140 hours of missed education time. Assuming a parent working a minimum wage job, $8.50 in Arkansas, had to take off 4 hours of work to vaccinate their child without compensation, the families in our program had combined savings of an estimated $1,360. For many families with Medicaid or no health insurance, the Health Department is the source of all their vaccines; we potentially prevented 40 visits. This data will be used to market the program to future parents and schools as we expand.

The registration form contained a survey adapted from Reiter's work from University of North Carolina to assess the current knowledge of our school's parents regarding the HPV vaccine and barriers to their child receiving it.[11] The Institutional Review Board at the University of Arkansas for Medical Sciences determined this survey was exempt from review because it was an evaluation of a quality improvement program.

The results of the survey included parents who consented for their child to receive the vaccine and returned the survey, thus excluding parents who had already vaccinated their child or were unwilling for their child to receive the vaccine. The results showed a majority of these parents were

knowledgeable about the HPV vaccine, had access to a physician, had a physician recommend the vaccine, and yet their child had not completed the vaccination series (Figure 2).

Discussion

We set out to serve a need in our community by forming a sustainable partnership between our clinic and its neighborhood schools. In a resource-rich country like the US, post-Affordable Care Act when all health insurance plans cover childhood immunizations, there is no reason for our youth to go unprotected when we have a safe and efficacious vaccine against preventable cancers. If we can no longer justify lack of resources, then we have to consider what other barriers are preventing the target population from the desired intervention and how can we overcome these barriers.

The survey results suggest that this is a population where public health efforts accomplished the goal of education but did not achieve the endpoint of vaccination. Recent systematic reviews of community interventions argue that education focused programs did not make a significant difference, while programs with a vaccination component made more of an impact than those that did not.[18-20]

The previous statement does not apply to student education.[21] We found that kids were surprised the vaccine could prevent cancer which motivated one student who initially refused vaccination for fear of needles to assent to vaccination. Upon asking the students, health teacher, and principal about the presentation, all appreciated the clarity of the presentation, the effort to get and keep students engaged, and the question session.

Strengths

Our HPV vaccination school-based model moved from idea conception to implementation in 5 months. Most of this time was spent forming our partnership with the Little Rock School District. We were able to bring current underutilized clinic resources, specifically the VFC Program, out into the community.

Limitations

Although our consent form was written to cover all 3 doses, our school nurse called parents before the 2nd and 3rd vaccination days to notify them and had 2 parents request their child not receive further vaccinations. We had not anticipated this and felt it was unethical to assume other parents still gave consent without a verbal confirmation. This prevented us from delivering 9 doses on our 3rd vaccination day because we could not reach the parents by phone. Next year, the consent form will specifically state consent is for all doses and it is the parent's responsibility to notify the school nurse if they wish to withdraw consent for their child.

The middle school students struggled with the current assent form modified from the parent consent form. In addition to staff working with each student individually on the assent form, a graphic novel narrative may convey the desired information in a more relatable fashion.

Poor scheduling of the education presentation limited the amount of time we had with students, minimized the number of questions they could ask and minimized our ability to affirm that knowledge was clearly attained. Next year, we will attempt to increase the presentation time and develop a short pre- and post-survey to assess the students' knowledge. Unfortunately, we did not have a male presenter this year, so the male students were less likely to ask about puberty changes or STIs; next year we will ensure each gender is represented.

We did not evaluate how many forms sent home with the student made it to the parents or made it back to the school nurse. We also did not measure how many students at the school had already completed the vaccine series. In the future, we plan to evaluate the impact of our program by using vaccination dose completion rates from the state immunization database for the zip codes that feed into the public schools.

We hope our model is replicable for other clinics, but if a clinic does not have the VFC Program, the cost of the vaccines may be prohibitive. We are fortunate to have all expenses related to the project covered under the operational budget of the clinic.

The Future

With accreditation standards for many professions mandating interprofessional education and medical practice shifting to team based care, interprofessional education during training is increasing. A project such as this allows teams to explore the Institute of Healthcare Improvement's Triple Aim of improving the health of the population, enhancing the experience and outcomes of the patient, and reducing per capita cost of care.[22] We plan to recruit junior students from the

colleges of Nursing, Pharmacy, Medicine, and Public Health into the project to fulfill a campus wide interprofessional education curriculum requirement. This provides a mechanism to expand the project and keep it sustainable in our clinic and community.

The new CDC recommendations reducing the number of required doses from 3 to 2 for those starting the HPV vaccine series younger than 15 years old came out while this article was in review during our second year. For schools with students 11-14 years old, we reduced the number of vaccination days to 2, 6 months apart. This is exciting news as it will make it easier for children and young adults to receive protection again HPV.

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Disclosures

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References

1. Human Papillomavirus Vaccine Information Sheet [Internet]. Centers for Disease Control and Prevention; 2016 Dec 2 [cited 2017 Jan 2]. Available from: https://www.cdc.gov/vaccines/hcp/vis/vis-statements/hpv.html. LINK
2. Moscicki AB. HPV infections in adolescents. Dis Markers. 2007;23(4):229-34. LINK
3. Arkansas - 2015 State Health Profile [Internet]. Centers for Disease Control and Prevention; 2015 Dec 22 [cited 2016 Jun 22]. Available from: https://www.cdc.gov/nchhstp/stateprofiles/pdf/arkansas_profile.pdf. LINK
4. Petrosky E, Bocchini JA Jr, Hariri S, Chesson H, Curtis CR, Saraiya M, Unger ER, Markowitz LE. Use of 9-valent human papillomavirus (HPV) vaccine: updated HPV vaccination recommendations of the advisory committee on immunization practices. MMWR Morb Mortal Wkly Rep. 2015 Mar 27;64(11):300-4. LINK
5. Dillner J, Kjaer SK, Wheeler CM, et al. Four year efficacy of prophylactic human papillomavirus quadrivalent vaccine against low grade cervical, vulvar, and vaginal intraepithelial neoplasia and anogenital warts: randomised controlled trial. BMJ. 2010 Jul 20;341:c3493. LINK
6. Taylor S, Bunge E, Bakker M, Castellsagué X. The incidence, clearance and persistence of non-cervical human papillomavirus infections: a systematic review of the literature. BMC Infect Dis. 2016 Jun 14;16(1):293. LINK
7. Reagan-Steiner S, Yankey D, Jeyarajah J, Elam-Evans LD, Singleton JA, Curtis CR, MacNeil J, Markowitz LE, Stokley S. National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13-17 Years--United States, 2014. MMWR Morb Mortal Wkly Rep. 2015 Jul 31;64(29):784-92. LINK
8. Healthy People 2020 Topics and Objectives: Immunization and Infectious Diseases [Internet]. US Department of Health and Human Services; 2012 [cited 2016 May 31]. Available from: https://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases. LINK
9. Garland SM. The Australian experience with the human papillomavirus vaccine. Clin Ther. 2014 Jan 1;36(1):17-23. LINK
10. Salit R. HPV vaccination rate for R.I. seventh graders "extremely encouraging" [Internet]. Providence (RI): Providence Journal; 2015 Nov 19 [cited 2016 Jun 22]. Available from: http://www.providencejournal.com/article/20151119/NEWS/151119182. LINK
11. Reiter PL, Brewer NT, Gottlieb SL, McRee AL, Smith JS. Parents' health beliefs and HPV vaccination of their adolescent daughters. Soc Sci Med. 2009 Aug;69(3):475-80. LINK
12. Perkins RB, Chigurupati NL, Apte G, Vercruysse J, Wall-Haas C, Rosenquist A, Lee L, Clark JA, Pierre-Joseph N. Why don't adolescents finish the HPV vaccine series? A qualitative study of parents and providers. Hum Vaccin Immunother. 2016 Jun 2;12(6):1528-35. LINK
13. Vercruysse J, Chigurupati NL, Fung L, Apte G, Pierre-Joseph N, Perkins RB. Parents' and providers' attitudes toward school-located provision and school-entry requirements for HPV vaccines. Hum Vaccin Immunother. 2016 Jun 2;12(6):1606-14. LINK
14. Zimet GD. Improving adolescent health: focus on HPV vaccine acceptance. J Adolesc Health. 2005 Dec;37(6 Suppl):S17-23. LINK
15. White MD. Pros, cons, and ethics of HPV vaccine in teens-Why such controversy? Transl Androl Urol. 2014 Dec;3(4):429-34. LINK
16. Holman DM, Benard V, Roland KB, Watson M, Liddon N, Stokley S. Barriers to human papillomavirus vaccination among US adolescents: a systematic review of the literature. JAMA Pediatr. 2014 Jan;168(1):76-82. LINK
17. HPV Mandates for Children in Secondary Schools [Internet]. Immunization Action Coalition; 2016 Mar 9 [cited 2016 May 31]. Available from: http://www.immunize.org/laws/hpv.asp. LINK
18. Fu LY, Bonhomme LA, Cooper SC, Joseph JG, Zimet GD. Educational interventions to increase HPV vaccination acceptance: a systematic review. Vaccine. 2014 Apr 7;32(17):1901-20. LINK
19. Niccolai LM, Hansen CE. Practice- and Community-Based Interventions to Increase Human Papillomavirus Vaccine Coverage: A Systematic Review. JAMA Pediatr. 2015 Jul;169(7):686-92. LINK
20. Walling EB, Benzoni N, Dornfeld J, Bhandari R, Sisk BA, Garbutt J, Colditz G. Interventions to Improve HPV Vaccine Uptake: A Systematic Review. Pediatrics. 2016 Jul;138(1). LINK
21. Gottvall M, Tydén T, Höglund AT, Larsson M. Knowledge of human papillomavirus among high school students can be increased by an educational intervention. Int J STD AIDS. 2010 Aug;21(8):558-62. LINK
22. Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff (Millwood). 2008 May-Jun;27(3):759-69. LINK