

Alexander G. Fiks, MD, MSCE*LDI Senior Fellow,**Assistant Professor of Pediatrics**University of Pennsylvania**and colleagues at the Center for Pediatric**Clinical Effectiveness, PolicyLab and**the Center for Biomedical Informatics**The Children's Hospital of Philadelphia****Improving HPV Vaccination Rates***

Editor's Note: Despite national guidelines and proven health benefits, vaccination rates for the human papillomavirus (HPV) remain far below those of other vaccines recommended for adolescents. HPV is the most common sexually transmitted infection in the U.S; it is responsible for about 25,000 new cancers each year. A series of three shots is recommended for all girls and boys at age 11-12, but significant barriers exist to starting and finishing this series. This Issue Brief examines some of the barriers and summarizes a successful, multipronged clinical intervention to improve vaccination rates.

HPV vaccination rates remain low

The HPV vaccine can prevent about 70% of all cervical cancer, 90% of all genital warts, and substantial numbers of oropharyngeal cancers. In 2006, the national Advisory Committee on Immunization Practices (ACIP) recommended the HPV vaccination for all girls aged 11-12 years, and extended that recommendation to boys aged 11-12 years in 2011. These recommendations are designed to promote vaccination when the vaccine is most effective: before the initiation of sexual activity and exposure to HPV.

- HPV vaccination rates are low. In 2012 only 54% of all girls in the US – and substantially fewer boys – had received the first dose. Just one-third of girls ages 13-17 were fully vaccinated.
- Despite the low uptake of the vaccine, it is still having an impact on infection rates. In the first four years of its introduction, the prevalence of vaccine-type HPV infection decreased 56% among girls ages 14-19.
- Parental concerns, clinician beliefs and practice styles, and adolescents' patterns of health care utilization all play a role in limiting the use of the HPV vaccine. Parents often delay HPV vaccination because they are reluctant to immunize prepubertal girls against sexually transmitted infections and because they have doubts about long-term safety and efficacy.
- Studies show that if clinicians recommend it, parents are more likely to have their children vaccinated for HPV. However, parents' beliefs about the vaccine may also influence clinicians' intentions to vaccinate: clinicians can be reluctant to recommend vaccination due to perceived parental concerns.

Interviews shed light on how clinicians, parents, and adolescents talk about vaccination

Given that parents, teens, and clinicians all report that their views are influenced by each other, Hughes and colleagues conducted interviews to understand what happens at the point of care. They interviewed 20 adolescent-mother-clinician triads (60 total interviews) within primary care sites at The Children’s Hospital of Philadelphia (CHOP) and identified three main themes:

- Parents often delayed, instead of completely refused, vaccination, and when they expressed reluctance, clinicians were hesitant to engage them in discussion.
- Clinicians used one of two strategies to present the HPV vaccine, either describing it as a routine vaccination without offering any additional information, or describing it as an optional vaccination while highlighting its risks and benefits.
- Teens viewed themselves as passive participants in the decision-making process, even when parents and clinicians reported including them.

Study evaluates automated decision support tool for both clinicians and families

Using this information, Fiks and colleagues designed and tested an intervention using electronic medical record (EMR) data to improve HPV vaccination rates. The “decision support” system targeted both families and clinicians.

- The *clinician-focused* intervention had three components: (1) electronic alerts for routine adolescent vaccinations when a patient’s EMR was opened, (2) a one-hour online or in-person educational presentation about vaccine safety, efficacy, and strategies for overcoming barriers to vaccine receipt, with site-specific HPV vaccination rates, and (3) three quarterly feedback reports on individual, practice, and network rates.
- The *family-focused* intervention featured automated reminder calls about well-visit or follow-up appointments. The calls also emphasized that the vaccine was recommended by the clinician and referred families to a website containing information on adolescent vaccines.
- From May 2010-May 2011, CHOP primary care practices sites were randomized to either receive the clinician-focused intervention or no intervention. Within these practice sites, 22,486 girls (11-17 years) due for HPV vaccine dose 1, 2, or 3 were randomized to either receive the family-focused intervention or usual care. At the start, 79% of the girls had not received any doses of the vaccine.

Intervention effective in improving rates of starting and completing HPV vaccination

After 12 months, the combined clinician and family-focused intervention resulted in significantly higher HPV vaccination rates compared to usual care, and reduced delays in initiating vaccination.

- In the usual-care group, vaccination rates for HPV dose #1, #2, and #3 were 16%, 65%, and 63%. The combined intervention increased those rates by 9, 8, and 13 percentage points, respectively. The clinician-focused intervention was most effective for initiating the HPV series (receiving HPV #1), whereas the family-focused intervention supported completion of the series (receiving HPV #2 and #3), as shown below.

	HPV #1	HPV #2 <i>(having received #1)</i>	HPV #3 <i>(having received #2)</i>
Combined intervention	25%*	73%*	76%*
Clinician-focused	24%*	64%	67%
Family-focused	18%	71%*	73%*
Usual care	16%	65%	63%

*Results significantly different from usual care

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- The intervention also was effective in decreasing time to vaccine receipt. Compared to usual care, adolescents in the combined intervention group were, on average, 151, 68, and 93 days faster at receiving vaccine doses 1, 2, and 3, respectively.
 - The incremental cost of the more effective interventions (compared to usual care) was low: \$6 per additional girl receiving HPV #1 in the clinician intervention, and \$10 and \$6 per girl in the family intervention receiving doses #2 and 3, respectively. The combined intervention added \$24 compared with the clinician intervention for HPV #1, and \$42 and \$189 compared with the family intervention for HPV #2 and 3.

Parents find decision supports tools acceptable

How did parents react to the family-focused intervention? Mayne and colleagues called parents shortly after a preventive care visit and asked about the acceptability of the family-focused automated reminder phone calls and if the calls had affected parents' information-seeking behavior, communication, and vaccine-related decision-making.

- 162 parents of girls who were due for HPV #1 completed the telephone interview. Of these parents, 80 had initially been randomized to receive the family-focused intervention.
- Of the 80 parents in the intervention group, 46% (37) remembered receiving an automated reminder call. Among those who did remember it, the vast majority found the call acceptable: only 2 parents reacted negatively, describing the call as "pushy" or "inappropriate."
- Of the 37 parents who remembered the call, 27% said it positively affected the likelihood they would have their child vaccinated.
- About half of the 37 parents remembered hearing the study's educational website mentioned during the automated call, but no one had actually visited it. However, 43% of the parents who remembered the call reported that it prompted them to seek information about the HPV vaccine on their own (e.g., through discussion with others or different websites).
- Parents in a practice that received the clinician-focused intervention were more likely to report that the clinician had discussed HPV vaccination at the visit (84% vs. 70%).

POLICY IMPLICATIONS

These series of studies show that decisions about HPV vaccines can be improved, and rates of HPV vaccines increased, with a low-cost intervention that supports both clinicians and families with information and reminders.

- The results highlight the central role that the clinician plays in promoting the receipt of the initial dose of HPV vaccine, and the central role families play in assuring that the entire HPV series is completed. A focus on either one alone is likely to be inadequate to fully realize the benefits of vaccination.
- The automated decision support system is driven by the electronic medical record. To the extent that EMRs are being adopted widely, the intervention can be built into primary care practices easily and cost-effectively.
- Families find clinical decision support programs based on EMR data acceptable. These programs may promote information-seeking, discussion with others, and productive decision-making in relation to the HPV vaccine. Phone call reminders

POLICY IMPLICATIONS

Continued

may be an effective short-term way of fostering information-seeking and vaccine-related discussion, but they may not be the best method of directing parents to specific educational content on the internet; other secure methods of reaching parents (e.g., email, text messaging, and patient portals) should be explored.

- Given the success of this intervention, future research should be directed at adapting it to support evidenced-based care in varied clinical contexts.

This Issue Brief is based on the following articles: A.G. Fiks, R.W. Grundmeier, S. Mayne, L. Song, K. Feemster, D. Karavite, C.C. Hughes, J. Massey, R. Keren, L.M. Bell, R. Wasserman, A.R. Localio. Comparing the effectiveness of automated decision support for families, clinicians, or both on human papillomavirus vaccine receipt, Pediatrics, June 2013, vol. 131, pp. 1114-1124; C.C. Hughes, A.L. Jones, K.A. Feemster, A.G. Fiks. HPV Vaccine decision making in pediatric primary care: a semi-structured interview study, BMC Pediatrics, vol. 11, published online August 30, 2011, doi: doi:10.1186/1471-2431-11-74; S. Mayne, D. Karavite, R.W. Grundmeier, R. Localio, K. Feemster, E. DeBartolo, C.C. Hughes, A.G. Fiks. The implementation and acceptability of HPV vaccination decision support system directed at clinicians and families, AMIA Annual Symposium Proceedings 2012, published online November 3, 2012, pp. 616-624.

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