PolicyLab
CENTER TO BRIDGE RESEARCH, PRACTICE & POLICY

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Increasing HPV Vaccination Rates Among Adolescents: Challenges and Opportunities

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EXECUTIVE SUMMARY

Most people in the United States will contract one or more types of human papillomavirus (HPV) in their lifetime. Several strains are known to cause tens of thousands of cancer cases in men and women each year, while others can lead to genital warts. Some HPV infections will go away on their own, but there is no way to tell which infections will resolve without symptoms and which will progress to these conditions. Managing the consequences of HPV costs the U.S. approximately $8 billion per year.[1]

Fortunately, there is a proven method to prevent most cancer-causing strains of HPV. The first HPV vaccine was introduced in 2006, and there are currently three available vaccines that all have strong safety and efficacy profiles. The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) added HPV vaccines to the list of routinely recommended vaccines for adolescent girls in 2006, and for boys in 2011.[2] In spite of the vaccine's life-saving potential and support from the medical community, low rates of HPV vaccination leave many children unprotected and at continued future risk of genital warts and cancer.[3]

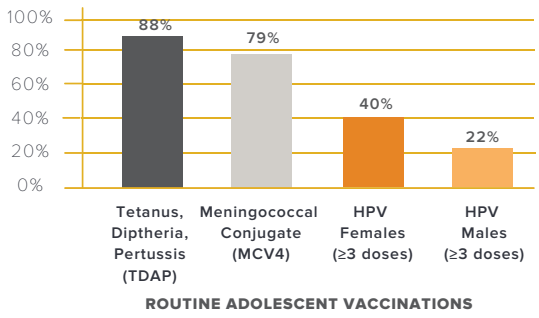
Healthy People 2020, a national health promotion and disease prevention initiative housed in the U.S. Department of Health and Human Services (HHS), set a goal of HPV vaccination rates of 80% for both boys and girls by 2020. Achieving these levels among children currently 12 years and younger could prevent more than 53,000 future cases of cervical and other HPV-related cancer in men and women.[3]

Actual HPV vaccination rates fall far short of this national target (Figure 1). In 2014, only 40% of adolescent girls and 22% of adolescent boys had completed the three-dose vaccine series. These rates are significantly lower than the rates of the other routinely recommended adolescent vaccines. In 2014, approximately 88% of adolescents received the Tetanus, Diphtheria, Pertussis (Tdap) vaccine, and 79% received the Meningococcal Conjugate Vaccine (MCV4).[4]

PolicyLab sought to understand the low uptake of HPV vaccines and conducted multiple studies to evaluate parents' decision-making, barriers to access, and both health care provider and health care system influences on vaccine delivery. In this *Evidence to Action* brief, we discuss the importance of HPV vaccines for cancer prevention, address the challenges that result in low uptake of the vaccine, and highlight four opportunities for action to help increase rates of HPV vaccination among boys and girls.

FIGURE 1

ROUTINE ADOLESCENT VACCINATION RATES IN 2014



SOURCE: Centers for Disease Control and Prevention. National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13–17 Years — United States, 2014. July, 31, 2015.

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BACKGROUND

WHAT IS HPV?

HPV is the name for a group of more than 120 viruses that make up the most common sexually transmitted infection (STI) in the U.S. and can cause serious health consequences in both men and women.

HPV CAUSES CANCER

HPV newly infects 14 million people and causes nearly 27,000 new cases of cancer in the U.S. each year.[1,5] HPV is often considered a women's health issue due to its association with cervical cancer which, on its own, leads to approximately 4,000 deaths per year. However, HPV is also a leading cause of a host of other anogenital and oropharyngeal cancers that affect both men and women.[5,6]

In addition to causing all forms of cervical cancer, HPV is associated with 90% of anal cancers; 71% of vaginal, vulvar and penile cancers; and all genital warts. HPV also has recently been identified as a major cause of oropharyngeal cancers, responsible for 72% of new cases. Oropharyngeal cancers, which affect the throat, base of the tongue and tonsils, are increasing in prevalence and are expected to surpass the number of cervical cancers by the year 2020.[1]

HPV IS COMMON AND EASY TO TRANSMIT

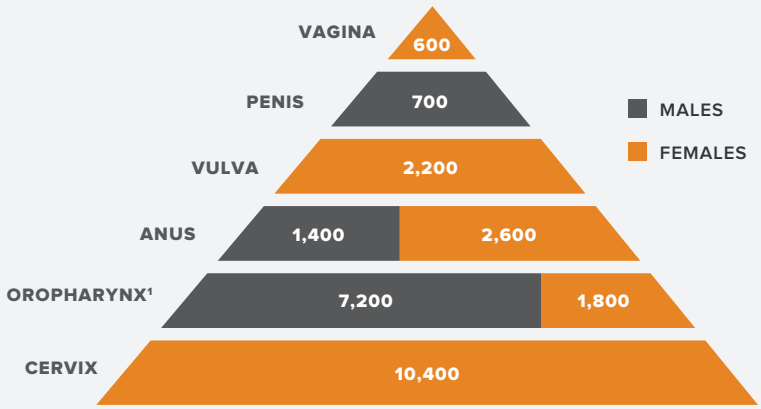
HPV prevention is important because of the cancers it causes in women and men, but also because of the ease with which the virus is unknowingly transferred to others. In 2014, more than 79 million people in the U.S. were infected with one or more types of HPV.[7]

Approximately 15 types of HPV are considered high-risk with the potential to cause cancer.[8] As the most common STI in the U.S., the majority of sexually active individuals will contract at least one type of HPV over their lifetime, including those who abstain from sexual activity until marriage, those who have only one partner and those who always use protection.[9] HPV prevalence is highest among younger people, and approximately half of all new infections occur in teens and young adults 15-24 years old.[6]

The virus can develop in many people with no noticeable symptoms and often resolves on its own. In these cases, a person may not realize he or she is infected; however, even when asymptomatic, the virus can still be transmitted unknowingly to another person who might respond differently and develop symptoms.[9] When HPV does not resolve on its own, persistent infection may

FIGURE 2

NUMBER OF CANCERS ATTRIBUTED TO HPV INFECTIONS IN THE U.S., 2006-2010



SOURCE: Centers for Disease Control and Prevention. HPV and Cancer: How many Cancers are Linked with HPV Each Year? June 2014.

CREDIT: The President's Cancer Panel. Accelerating HPV Vaccine Uptake: Urgency for Action to Prevent Cancer. 2014.

[1] Oropharyngeal cancers affect the throat, base of the tongue and tonsils.

progress to cancer, and there is no way to know who will have a persistent infection. Cancers generally take many years to develop after initial infection,[10] and the presence of the virus may not be known until after signs of cancer are detected.

WHAT ARE HPV VACCINES?

HPV vaccines are the second cancer-prevention vaccine – after the Hepatitis B vaccine – to be approved by the U.S. Food and Drug Administration (FDA) and routinely recommended by the CDC. There are currently three available HPV vaccines, and each is administered as a three-dose series over at least six months. Gardasil, the first HPV vaccine, was approved and recommended for females in 2006, and later for males in 2011. Gardasil protects against four strains of HPV, including two that cause approximately 70% of all cervical cancers, and others that cause most cases of genital warts and several other anogenital cancers in men and women. The second HPV vaccine called Cervarix was approved and recommended only for females in 2009, and protects against the same two strains of cervical cancer-causing HPV. The most recent vaccine, Gardasil 9, covers the same 4 strains as Gardasil for both males and females, but also protects against 5 more strains that cause an additional approximately 20% of cervical cancers.[11] Gardasil 9 was officially added to the CDC's HPV vaccine recommendation in 2016.

The CDC recommends that all girls and boys complete the vaccine series at age 11-12 as part of their routine vaccination schedule. Additionally, the CDC also recommends that all unvaccinated women up to age 26 and men up to age 21, as well as children as young as age 9 with a history of sexual abuse, complete the series.[2]

In the six years following the introduction of the first HPV vaccine, surveillance studies showed that the prevalence of HPV types covered by the vaccines decreased by 64% in 14- to 19-year-old females, and by 34% in 20- to 24-year-old females. Additionally, these types of HPV were less likely to be found in 14- to 24-year-old females who received at least one dose of the vaccine (2.1%) than those who were unvaccinated (16.9%).[12]

While no medical intervention is 100% risk-free, adverse side effects were reported for only 0.03% of the more than 67 million doses administered between 2009 and 2014. The majority of these side effects included soreness at the injection site, nausea and dizziness, resolved on their own, and did not require additional medical care.[13]

WHAT DO HPV VACCINES COST?

HPV vaccines are among the most expensive vaccines recommended for routine administration in children in the U.S. The cost of each HPV vaccine dose ranges from $120 to $163, a potential total cost of up to $490 for the three-dose series, not including physician fees.[14] Although most insurance plans have always covered the cost of vaccines recommended by ACIP, some contain cost-sharing requirements, co-payments or other restrictive policies limiting access. However, all new insurance plans are required under the Affordable Care Act (ACA) to provide ACIP-recommended vaccines, including HPV vaccines, at no cost to the patient.[15] All HPV vaccines, including Gardasil 9, are also covered by the Vaccines for Children program, which provides vaccines for Medicaid-eligible and many uninsured and underinsured children.[16]

PROBLEM: LOW VACCINATION RATES

Despite high efficacy and an excellent safety profile, rates of HPV vaccination remain low compared to other routinely recommended vaccines for the same age group. In 2014, only six out of 10 girls ages 13-17 years old received at least one dose of the HPV series, and only four out of 10 were fully protected with all three doses. The rates for boys of the same age were even lower with only 42% starting and 22% completing the series. This compares to 88% for Tdap and 79% for MCV4 for all 13- to 17-year-old boys and girls in the same year.[4] The reasons for low uptake of HPV vaccines are multi-factorial and lie within three main categories:

1. Parent Hesitancy
2. Provider Recommendation Practices
3. Accessibility

1 PARENT HESITANCY

Many parents question HPV vaccine safety and durability of protection. While all studies and ongoing surveillance show that HPV vaccines have a strong safety profile, media reports about unconfirmed adverse events have amplified ongoing concerns. Results from the 2013 National Immunization Survey found additional reasons cited for parental hesitancy including lack of knowledge about HPV and the vaccine (15.5% for both boys and girls), no provider recommendation (13% for girls and 22.8% for boys), and feeling that the vaccine is not necessary (14.7% for girls and 17.9% for boys).[13]

The association of HPV vaccines with a STI has also contributed to hesitancy and low uptake. Some parents fear that allowing their young teens to be vaccinated against a STI could be perceived as condoning sexual activity. Some worry that the knowledge of being protected from this infection could lead their children to participate in riskier sexual behavior. There is no evidence, however, to suggest that receiving the vaccine will lead to any changes in behavior. In fact, getting an HPV vaccine can be an educational opportunity to talk about the risks of unsafe sex and promote healthier sexual decision-making.[17]

The perceived lack of need for HPV vaccines among younger adolescents has been a particularly significant contributor to parental hesitancy. Parents often believe HPV vaccines are not necessary or can wait until closer to the adolescent's initiation of sexual activity. Delaying vaccination is a problem for several significant reasons.

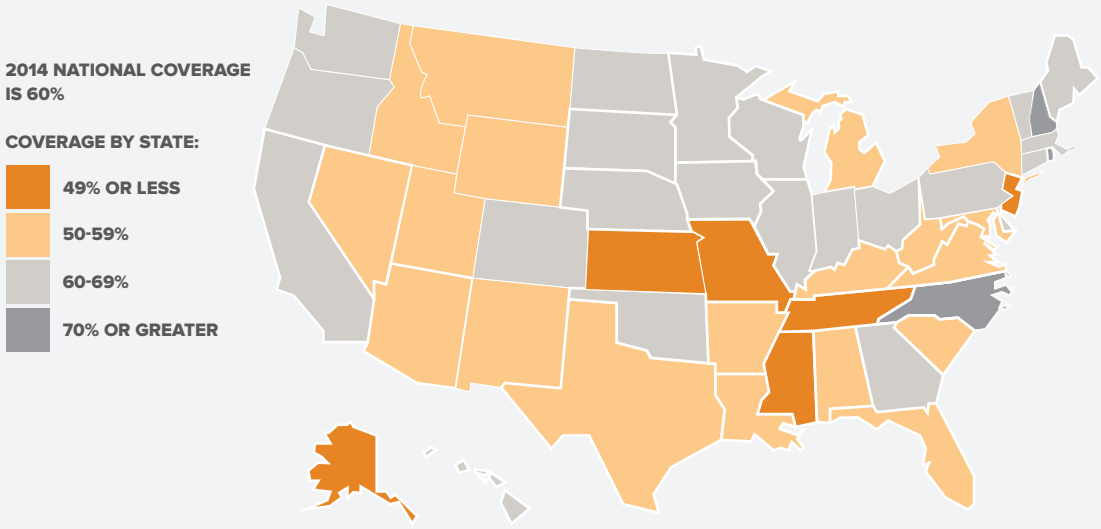
- Parents often underestimate their children's sexual experience. A 2013 study showed that 47% of mothers of 11- to 18-year-olds inaccurately reported that their child was not sexually active. While most children were not sexually active at 11 or 12 years old, of those who were, 78% of mothers inaccurately reported otherwise.[18] Earlier vaccination helps ensure protection before potential risk of infection, as is the purpose of all vaccines.
- The recommended timeline for HPV vaccination corresponds to the already existing vaccination series for Tdap and MCV4, when visits to pediatricians are made specifically to receive these vaccines. Initiation of the HPV vaccine series during these visits is critical because older teens attend preventive care visits less frequently[17] and are therefore less likely to get vaccinated.

FIGURE 3

HPV VACCINATION RATES REMAIN LOW ACROSS THE U.S

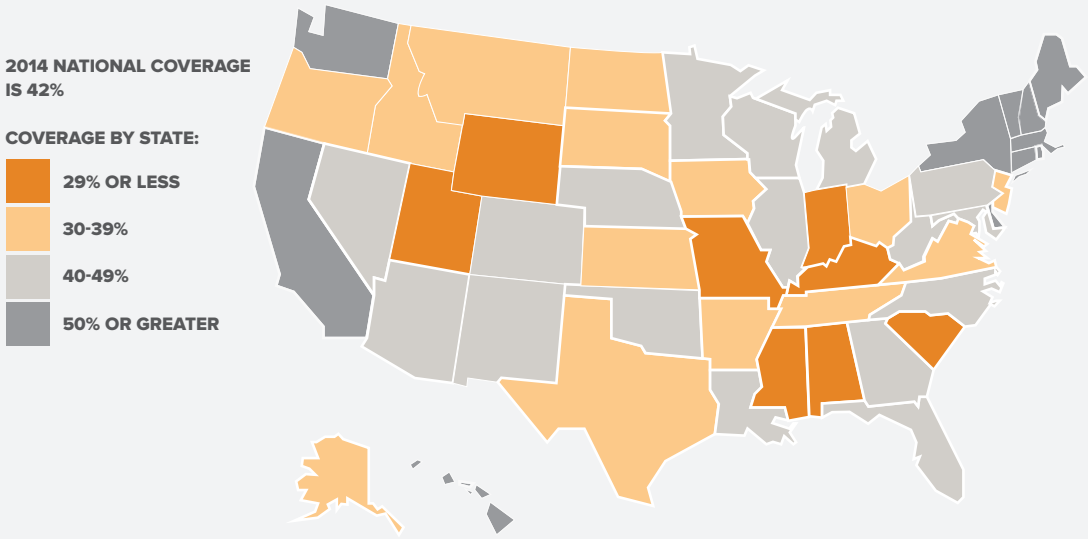
4 OUT OF 10 GIRLS ARE UNVACCINATED NATIONWIDE

PERCENTAGE OF ADOLESCENT GIRLS WHO HAVE RECEIVED ONE OR MORE DOSES OF THE HPV VACCINE IN 2014



6 OUT OF 10 BOYS ARE UNVACCINATED NATIONWIDE

PERCENTAGE OF ADOLESCENT BOYS WHO HAVE RECEIVED ONE OR MORE DOSES OF THE HPV VACCINE IN 2014



SOURCE: Centers for Disease Control and Prevention. HPV Vaccine Coverage Maps - Infographic. July 30, 2015.

2 PROVIDER RECOMMENDATION PRACTICES

Health care providers often emphasize recommendations for HPV vaccines less than other routinely recommended adolescent vaccines. Given that most families follow the health care advice of their primary care providers, the lack of a strong recommendation makes it less likely that the vaccine will be administered on time or at all.

Some pediatricians are less comfortable discussing STIs with patients and parents, and therefore may be less willing to push for vaccination and address parental hesitancy. In such cases, pediatricians may be more willing to adhere to a parent's request to delay HPV vaccines. They may also be more comfortable reserving their recommendation for older teens, rather than for 11- and 12-year-olds.[3] Additionally, the fact that HPV vaccines are not required for school enrollment in most states can lead providers to present HPV vaccines as optional compared to the other adolescent vaccines, leaving parents with the misperception that HPV vaccines are not as important in protecting their children's health.

Some clinicians may also intentionally or unintentionally vary the strength of their recommendations based on patient residence and socioeconomic status. Providers have been shown to make stronger recommendations for vaccination when treating minorities and teens in urban settings than for white and suburban teens. This variation in strength of the recommendation for HPV vaccination could be due to the assumption that urban populations and teens from low socioeconomic households have a greater likelihood of early sexual initiation and are more at risk of being exposed to HPV at an earlier age. Disparities in care based on demographic stereotypes, however, can lead to missed opportunities for protection and leave certain populations more vulnerable to infection.[19]

3 ACCESSIBILITY

Compared to children and older adults, adolescents and young adults are less likely to seek out preventive care, which makes it challenging to get them to a health care provider for all three required doses.[17] Teens without a regular provider may also lack education about HPV and the HPV vaccines, reducing the likelihood of receiving it. In addition, HPV vaccines are not required for school entry in nearly all states,[20,21] so in the absence of a health care provider who makes an unequivocal recommendation, some patients may not be aware of the importance of HPV vaccination.

The relatively high cost of the vaccine – up to $490 for the full series – could also be a deterrent. Although the ACA now requires all new insurance plans to fully cover the cost of routinely recommended vaccinations, some plans that have been grandfathered in – meaning that they were already in place and allowed to continue after ACA passage – might still require out-of-pocket costs to the patient.[22] Uninsured and underinsured families may not be aware that assistance is available through the federal Vaccines for Children program to cover the full cost of the vaccine for teens. Additionally, a gap in coverage remains for uninsured and underinsured 19- to 26-year-old women and 19- to 21-year-old men – for whom the vaccine is recommended if not previously received – who live in states that do not provide additional assistance for adults.[11]

WHAT WE LEARNED

At PolicyLab, our research portfolio on HPV vaccination sought to identify the factors contributing to low uptake compared with other routinely recommended childhood and adolescent vaccines. Our studies found:

1. Routine recommendations and effective communication strategies positively influence HPV vaccine uptake
2. Multiple barriers can prevent providers' intention to recommend HPV vaccines from translating into vaccine uptake
3. Decision-support tools can help capture missed opportunities for HPV vaccination

1 ROUTINE RECOMMENDATIONS AND EFFECTIVE COMMUNICATION STRATEGIES POSITIVELY INFLUENCE HPV VACCINE UPTAKE [19]

PolicyLab sought to determine the effect of providers' HPV vaccine recommendation on immunization rates through an evaluation of provider-patient interactions. In 2011, we interviewed 20 adolescent-mother-clinician triads after preventive well visits that included a HPV vaccine recommendation to better understand the decision-making process at the point of care.

Of the 20 female patients interviewed, nine received a HPV vaccine on the day of the visit. The 11 who did not get a HPV vaccine did get, or had already received, all other vaccines recommended for their age group, suggesting that HPV vaccines were treated differently. Three significant themes emerged from the findings:

- **Parents of young teens make most vaccine – and general health care – decisions.** Teens in this study viewed themselves as passive participants in the decision-making process. Even when their mothers and doctors invited them to engage in the discussion, they tended to defer to their mothers' opinions. This suggests that interventions focusing on educating parents and/or empowering teens to take charge of their own health care decisions might be most effective at increasing vaccination rates.
- **Parents of young teens tend to delay rather than refuse HPV vaccines.** Only one mother in the cohort indicated that she would never consent for her child to receive the vaccine. The other 10 mothers requested to delay the recommended schedule, and most said their decision was based on HPV's association with sexual activity. Clinicians in this study generally did not push HPV vaccines when parents wanted to wait until closer to when they believed their daughters might become sexually active.
- **The type of recommendation matters.** Some providers in this study placed a stronger emphasis on other recommended adolescent vaccines like Tdap or MCV4. Some also considered demographic information and were less likely to routinely recommend the HPV vaccine for girls from higher-income suburban families with a lower perceived likelihood of initiating sexual activity early than girls from urban areas. The variation in provider recommendation type directly affected vaccine initiation rates. Providers who routinely presented HPV vaccines as being due for the adolescent in the same way as other age-appropriate recommended vaccines – also known as a "presumptive recommendation" – had a vaccination rate of 67%. Most clinicians, however, presented HPV vaccines as optional and separately highlighted their risks and benefits during the vaccine discussion. These interactions only resulted in a 36% vaccination rate.

2 MULTIPLE BARRIERS CAN PREVENT PROVIDERS' INTENTION TO RECOMMEND HPV VACCINES FROM TRANSLATING INTO VACCINE UPTAKE

PolicyLab was interested in determining pediatricians' intention to recommend HPV vaccines and the extent to which intention has an effect on actual rates of vaccination. In 2006, shortly after the FDA approval of Gardasil for adolescent girls, we conducted a study of 105 primary care pediatric clinicians to evaluate their reported intention to recommend HPV vaccines to their patients.[23]

Clinicians reported high overall intention to recommend HPV vaccination, and were more likely to do so for older adolescents (92%) than for the ACIP-recommended population of 11- to 12-year-olds (78%).[23] To determine whether this high intention translated into HPV vaccine uptake, PolicyLab followed up with this cohort of providers and evaluated more than 18,000 of their vaccine-eligible female patients seen over the course of three years. Results showed a modest association between intention and uptake, and patients who saw clinicians with high intention to recommend the vaccine received the first dose approximately one month earlier than others. While the majority of girls (85% of 11- to 12-year-olds and 95% of 13- to 18-year-olds) saw providers with high intention to recommend HPV vaccines, only 30% initiated the series.[24]

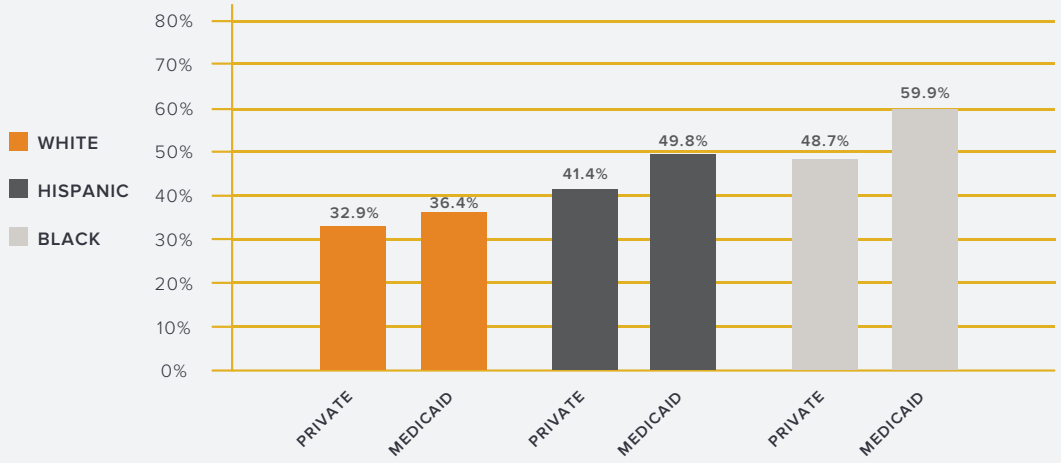
These findings indicate that other factors can prevent a clinician's high intention to recommend a vaccine from translating into a patient actually receiving the vaccine. For instance, girls who have a sick visit, during which more time and attention are spent on treating an illness, are five times less likely to receive HPV vaccination than girls attending preventive visits. This suggests that there is room for improved recommendations during sick visits since the HPV vaccination is safe to receive even when a patient is mildly ill. Additionally, provider intention to recommend the vaccine might not result in actual – or strong enough – recommendations for reasons such as time constraints and parental resistance. Brief informational interactions with parents about this particular vaccine might be insufficient and ongoing dialog could be necessary to adequately address parental concerns.[24]

Race, ethnicity and socioeconomic status can also impact vaccination rates. PolicyLab participated in a 2015 study that included nearly 59,000 adolescent male patients to identify trends in HPV vaccine initiation after it was approved for use in boys in 2009 (Figure 4). Results showed that racial and ethnic minority males were significantly more likely to initiate the HPV vaccine series than white adolescent males. Disparities in initiation are further exacerbated by socioeconomic conditions. Boys from lower-income families who were covered by Medicaid, regardless of race, were more likely than those with private insurance to receive the first dose. These findings are consistent with earlier research showing similar trends in greater uptake for traditionally marginalized populations among adolescent girls. Therefore, sociodemographic differences can influence provider recommendations and family acceptance of HPV vaccines.[25]

Results from these studies point to ways the medical community can improve provider training and preparation to encourage the strongest possible recommendations, regardless of their own biases, for all eligible adolescents at the recommended age of vaccination.

FIGURE 4

SOCIODEMOGRAPHIC BREAKDOWN OF VACCINE INITIATION* FOR 11- TO 18-YEAR-OLD BOYS, 2009-2013



ODDS OF RECEIVING THE FIRST DOSE OF THE HPV VACCINE WERE HIGHER FOR BLACK AND HISPANIC MALE ADOLESCENTS THAN FOR WHITE MALE ADOLESCENTS, AS WELL AS FOR THOSE COVERED BY MEDICAID ACROSS ALL RACIAL/ETHNIC GROUPS.

* 11- to 18-year-old males who received at least one dose of the HPV vaccine during the study period

3 DECISION-SUPPORT TOOLS CAN HELP CAPTURE MISSED OPPORTUNITIES FOR HPV VACCINATION[26,27]

A missed opportunity occurs every time an unvaccinated adolescent visits a doctor and does not receive a HPV vaccine – whether due to parent hesitancy, insufficient provider recommendation or time constraints. To better understand how to avoid these missed opportunities and maximize vaccination coverage, PolicyLab conducted a study to evaluate the impact of different interventions on providing any of the three doses in the HPV vaccination series. The study, which included more than 22,000 adolescent girls, evaluated the effectiveness of decision-support tools provided to clinicians, families or a combination of both. The clinician-based intervention included educational sessions about HPV vaccines, reminder alerts that appeared in the electronic health record (EHR) each time the patient's record was opened and regular performance feedback including the clinician, practice and network immunization rates. The family-based intervention sent automated phone calls reminding families about upcoming vaccinations and visits, as well as directing them to an educational website. To determine the impact of each intervention, results were measured against the rate of uptake in the group that received no intervention.

Clinician-focused decision support was most effective at promoting initiation of the HPV vaccine, increasing rates for the first dose by eight percentage points. The clinician-focused intervention also increased vaccination opportunities for all three doses at sick visits. In contrast, the family intervention was most effective at increasing the proportion of girls who received the second and third doses of a HPV vaccine during sick visits. The magnitude

of benefit of the clinician intervention differed by practice location. This method had a greater effect on patients accepting the first dose of the vaccine during preventive visits at suburban practices than preventive visits at urban practices. At sick visits, benefits were greater at urban than suburban practices. It is worth noting that in practices with no intervention, HPV vaccine uptake was significantly lower in suburban compared to urban locations.

These findings support the importance of provider recommendations as a key predictor of HPV vaccine series initiation, but a family-focused approach combined with provider recommendations can help support completion of the three-dose series once the family has already accepted HPV vaccination. Additionally, this study reiterates the potential variation in provider recommendations and the need to address disparities in care.

WHAT WE CAN DO

PolicyLab researchers have identified four opportunities for action to help increase HPV vaccination rates among adolescents to achieve the Healthy People 2020 goal of 80% for boys and girls.

1. Support health care providers' ability to make strong HPV vaccine recommendations
2. Capture commonly missed opportunities for vaccination
3. Implement policies that improve access to HPV vaccines
4. Increase public education and awareness efforts targeting parents and teens

1 SUPPORT HEALTH CARE PROVIDERS' ABILITY TO MAKE STRONG HPV VACCINE RECOMMENDATIONS

A provider's recommendation is one of the strongest predictors of vaccine acceptance. Therefore, it is important that clinicians make strong and timely recommendations about vaccines and are able to confidently address parental concerns. HPV vaccines present unique challenges for providers responsible for recommending their use, such as discussing HPV's association with sexual activity with parents of young teens. Providing clinicians with information about vaccine safety and efficacy, however, may increase endorsement of current HPV vaccine recommendations. Strategies to better prepare providers for making strong HPV vaccine recommendations include the following:

KEY TALKING POINTS FOR CLINICIANS

- HPV vaccines have a higher immune response in 11- to 12-year-olds than older teens, so vaccinating now may provide better protection later.
- There is no link between vaccination and riskier sexual behavior.
- Even those who abstain from sex until marriage can acquire the infection from their marital partner.
- It is important to receive all three doses for full protection. Schedule your next appointments before you leave today!

EXAMPLES OF PROVIDER EDUCATION OPPORTUNITIES

- The CDC and the American Academy of Pediatrics offer CME opportunities related to vaccine delivery and communication, including courses focusing on the challenges of successfully recommending HPV vaccines.[28,29]
- The University of Pennsylvania offers an intensive one-week course on vaccines for fourth-year medical students each spring. The course covers the science of vaccines, as well as legal, political and social issues related to vaccination and how to communicate effectively with vaccine hesitant parents.[30]
- In 2013, the Philadelphia Department of Public Health's Immunization Program received a CDC grant to develop interventions to increase HPV vaccination rates. Philadelphia's Immunization Program worked with the Health Federation of Philadelphia, a public health nonprofit focused on improving access to and quality of health care for the underserved, to organize provider education sessions and offer continuing education credits on HPV risks, benefits of immunization, ways to communicate with patients and parents about the vaccine and tips on how to overcome barriers to HPV vaccination.[31]

- **Health care educators should place a stronger emphasis on training about vaccine safety and efficacy and communication skills** at every level of medical education, including medical school and continuing medical education (CME). To improve the current level of HPV vaccine recommendations, provider education may be most effective when:
  - Providing specific talking points to help address vaccine efficacy and safety concerns, as well as concerns regarding the association of HPV with sexual activity.
  - Placing a strong emphasis on improving brief motivational interview skills to communicate the importance of the vaccine and alleviate parental hesitancy during the short time allotted for typical office visits.
  - Helping clinicians learn to recognize their own concerns and biases about vaccines generally and HPV vaccines more specifically and be aware of how this might influence their presentation and delivery of a recommendation.
- **Health care providers should use communication tools during patient consultation.** Communication tools can help ensure that clinicians' expertise about HPV and the vaccine is adequately conveyed through strong and efficient recommendations.
  - EHR reminder alerts can increase the likelihood that providers will recommend HPV vaccines at every appropriate patient encounter, including sick visits. Included in these reminders can be responses to a list of frequently asked questions by patients and parents and talking points specific to common concerns related to each vaccine for which a patient is due. Making this information readily available as a reminder for the provider can save time and lead to a more effective conversation that properly informs the patient and parent.
  - Based on recommendations from the 2014 President's Cancer Panel, the CDC developed a set of communication tools for use in practices that provide HPV vaccinations, including strategies for talking with parents about HPV vaccines, efficacy and safety information and multi-lingual informational materials to provide to parents.[3,32] For instance, one tool offers providers tips and time savers for engaging with HPV vaccine hesitant parents. It lays out common parental concerns and knowledge gaps as found in CDC research and suggests specific messaging that is straightforward, evidence-based and shown to increase vaccine acceptance.[32]

2 CAPTURE COMMONLY MISSED OPPORTUNITIES FOR VACCINATION

If all adolescents received HPV vaccines at the same time as other routinely recommended vaccines, most would at least initiate the three-dose series at the appropriate age. To capture these and other missed opportunities and increase the number of young teens who are protected against HPV infection, health care providers should:

- **Make a recommendation during sick visits as well as preventive visits.** Adolescents attending well visits are significantly more likely to receive HPV vaccines compared to adolescents during sick visits, even though the vaccine can be given when the patient is mildly ill. This is a missed opportunity particularly for the second and third doses because adolescents and young adults only have recommended well visits every 12 months, making it difficult to complete a three-dose vaccine series within six months. In addition, they are less likely than other age groups to regularly attend preventive visits. Therefore, sick visits may be the only available opportunities to complete the series.
- **Start the conversation about the importance of HPV vaccines well before the vaccine is due.** The association of HPV vaccines with sexual activity is a deterrent for some parents who are uncomfortable discussing the sensitive subject regarding their young teens. Preparing parents of younger children – before the topic of sex is an issue – by including HPV vaccines in a list of vaccinations due for the next few visits could allow for a less emotionally driven conversation and more easily make the case that it is simply routine. This approach is also an opportunity for parent and patient education about vaccines more generally.
- **Avoid segmenting HPV from other vaccines.** The HPV vaccination is not required for school entry in most states, but it should not be treated differently. Providers can use a presumptive recommendation by simply including HPV vaccines in the list of routine vaccines that are due at any given visit, rather than referring to it as optional. For example, saying *"Your child is due for some shots today,"* and listing all recommended vaccines is more effective than saying *"Your child is due for Tdap and meningitis shots today, and we can talk about HPV vaccines as well."*
- **Resist alternative schedules requested by parents to help prevent delays until later adolescence** when patients are less likely to attend preventive visits. HPV

EXAMPLES OF EFFECTIVE MESSAGING FOR PROVIDERS

- **CDC RESEARCH SHOWS:** The "HPV vaccination is cancer prevention" message resonates strongly with parents. In addition, studies show that a strong recommendation from providers is the single best predictor of vaccination.

  TRY SAYING: HPV vaccination is very important because it prevents cancer. I want your child to be protected from cancer. That's why I'm recommending that your daughter/son receive the first dose of HPV vaccine today.

- **CDC RESEARCH SHOWS:** Providers who emphasize their personal belief in the importance of HPV vaccines help parents feel secure in their decision.

  TRY SAYING: I strongly believe in the importance of this cancer-preventing vaccine, and I have given HPV vaccines to my son/daughter/grandchild/niece/nephew/friend's children. Experts (like the American Academy of Pediatrics, cancer doctors and the CDC) also agree that this vaccine is very important for your child.

SOURCE: Centers for Disease Control and Prevention. Human Papillomavirus (HPV): For Clinicians. 2015; http://www.cdc.gov/hpv/hcp/index.html.

vaccines offer more robust protection for preteens who will build up even higher antibody levels than older teens, and there is no benefit to delaying it.

- **Use strategies such as automated phone calls and text messages to remind parents about upcoming appointments and vaccines that are due for their children.** This approach would be particularly helpful at increasing rates of HPV vaccine completion by reaching patients who initiate the HPV vaccine series when they receive other recommended vaccines but might not remember to return for subsequent doses.
- **Consider practice-based policies that increase access to HPV vaccines for hard-to-reach patients.** Many families have trouble making appointments during normal business hours. Particular strategies could include walk-in hours and after-school vaccination clinics.

3 IMPLEMENT POLICIES THAT IMPROVE ACCESS TO HPV VACCINES

Public attitudes toward HPV vaccination and access to vaccines vary widely from state to state. Adjusting state policies can help to target the most challenging barriers to increase vaccination rates. The following recommendations can be adopted and adapted by every state to meet its unique needs.

- **Utilize mandates that are meaningful and enforceable.** Laws requiring vaccination for school entry can help to boost vaccination rates, but only if they are adequately implemented. If states choose to pass legislation requiring HPV vaccines, then HPV vaccines should be held to the same standards as all other required vaccines in that state, including exemption procedures and penalties for failing to adhere to the mandate. For a history of HPV vaccine mandates, see Figure 5.
- **Assist health care providers with the cost of acquiring recommended HPV vaccines for distribution.** Health care providers who treat privately-insured patients pay for their supply of vaccines out-of-pocket, in addition to the cost of storing and administering them. Providers generally make very little – or even lose – money due to inadequate reimbursement, which is a disincentive to supply and strongly recommend HPV vaccines.[3] Vaccine supply programs that financially support providers in acquiring vaccines could help to alleviate this burden.
  - Rhode Island provides free vaccines to health care providers through the Childhood Immunization Program and Adult Immunization Program to help eliminate cost as a barrier to immunization. Providers must enroll in the state-supplied vaccine program annually to receive the vaccines at no cost. Providers may still charge a fee for administering vaccines, which is generally covered by insurance. Health care providers who receive free vaccines from the state are required to enroll in KIDSNET, an electronic registry that tracks immunization records for children, uses EHR alerts to help providers keep their patients up to date on immunizations and assesses vaccination coverage rates.[33]
- **Require third-party payers to provide more adequate, consistent coverage of the full vaccine cost.** Insurance providers should be required to cover the total cost of the vaccine and physician fees with no out-of-pocket cost to the patient. Although the ACA requires all new health plans to do so, some grandfathered plans still include inadequate coverage and create a financial barrier to protection. Additionally, insurers should adequately reimburse providers for all costs associated with vaccine purchasing, storage and administration to eliminate the disincentive of stocking and ultimately recommending the vaccine.[3]

- **Address the gap in coverage for uninsured and underinsured young adults for whom HPV vaccines are recommended but who face financial barriers to access.** The federal Vaccines for Children program will cover the cost for underinsured children up to age 18 to receive recommended vaccines, but many states do not have the same type of assistance for adults.[11] Adult assistance programs should be established to eliminate the financial barrier for young adults to receive their recommended vaccines.
    - Uninsured adults in Rhode Island can receive recommended vaccines at no cost at Patient Assistant Program Sites throughout the state,[33] which provide vaccines for uninsured adults 19-26 years of age or who are considered to be at high risk.[34]
- **Ensure easier access to vaccines by allowing them to be given in alternative locations such as school-based clinics and pharmacies.** Allowing pharmacists to provide vaccines, such as the influenza vaccine, has been shown to increase immunization rates.[35] Pharmacies are often more convenient for families, and some adolescents are more likely to visit pharmacies than a primary care physician.[36] The availability of HPV vaccines in pharmacies could be particularly helpful at increasing completion rates for adolescents who receive the first dose of the series during a doctor's visit and need a more convenient time and location to receive the subsequent two doses. Access to HPV vaccines for adolescents in pharmacies, however, remains a challenge. As of March 2015, 46 states plus D.C. and Puerto Rico allow pharmacists to administer HPV vaccines. The recommended population of 11- to 12-year-olds, however, has limited or no access to vaccines in pharmacies in 29 states due to age restrictions, prescription requirements and issues related to consent when a parent is not able to be present.[37]

FIGURE 5

HISTORY OF HPV VACCINE MANDATES IN THE U.S.

Until 2015, Virginia and Washington, D.C. were the only states to require HPV vaccines for school entry, and yet their rates of uptake remained consistently below the national average. A number of weaknesses within these mandates may be associated with their inability to boost vaccination rates.

First, the mandates targeted only half the adolescent population. Both Virginia and D.C. originally required only middle school girls to receive the vaccine and excluded boys from the mandate.

Second, enforcement of the mandate in these states has been less stringent than for other required vaccines. Virginia's HPV vaccine requirement is more consistent with an educational mandate and simply informs parents about the availability of the vaccine. Parents must show proof of vaccination or a medical or religious exemption for all other required vaccines, but no such documentation is necessary for the HPV vaccine, for which vaccination is left to the parent's or guardian's sole discretion.[38] Unlike Virginia, D.C. requires parents to sign a form indicating their refusal to participate in HPV vaccination. However, the law allows parents to opt out for any reason, while only religious and medical exemptions are accepted for every other required vaccine.

D.C. updated its HPV vaccination mandate in 2014 to include middle school boys and require annual renewal of the exemption and saw a marked increase in vaccination rates the following year.[4,39] The improvement of the vaccination program following these changes indicates that an overly exclusive scope and lack of enforcement can make it more difficult for legislation to achieve its intended outcome of increased vaccination rates.

Rhode Island became the third state to require HPV vaccination with a school entry mandate passed in 2015 that will address the HPV vaccine in the same way it does other required vaccines. The state requires HPV vaccination for both boys and girls for entry into 7th grade, and allows only medical and religious exemptions.[40] Parents who wish to opt their children out of the vaccine must visit the school to review and sign religious exemption forms in the presence of the school nurse or to receive medical exemption forms that must be completed by a health care provider.[41] The Rhode Island mandate is the strongest HPV vaccine legislation in the U.S. to date and, as outcomes data become available, is likely to provide evidence to inform efforts to increase vaccination rates for all recommended vaccines moving forward.

Similarly, multiple studies have shown that offering vaccinations in school-based health centers has helped to remove barriers to access, provide legitimate vaccine education and boost immunization rates, including for HPV.[42,43] Policies that impact the ability to provide vaccination in a school setting vary from state to state and can make it difficult to establish effective, sustainable programs.[42] Policy changes such as expanding access to HPV vaccines in pharmacies for younger adolescents and increasing the availability of vaccines in schools can help increase the likelihood of vaccine series completion.

- **Allow teens to receive HPV vaccinations without their parents physically present.** Current laws in every state and D.C. allow minors to consent to testing and treatment for STIs with few limitations based on age, which could be expanded to include consent for the HPV vaccination. The Society for Adolescent Medicine recommends that health care sites develop procedures to enable minors to receive vaccinations without a parent present either based on minor consent or previously obtained parental consent, within the context of state legal requirements.[44]

- **Establish laws allowing minors to seek confidential sexual and reproductive health services in states where they do not currently exist, and include HPV vaccines in this list of services.** Although minors in all states can consent to sexual health care services, confidentiality about such services is not always guaranteed. The possible release of sensitive medical information to parents is a known deterrent that can lead adolescents to delay care. Six states currently allow minors to seek medical services without notification or an explanation of benefits (EOB) being sent to their parents,[45] a policy that should be extended for sexual and reproductive health services in the remaining 44 states. Allowing private conversations between youth and their doctors to remain confidential could help them take charge of their health care decisions and pursue opportunities for HPV vaccination, especially among youth whose parents remain hesitant.

EXAMPLES OF STATES WHERE MINORS HAVE ACCESS TO VACCINES WITHOUT A PARENT PRESENT

- The **Rhode Island** Vaccinate Before You Graduate Program helps adolescents catch up on vaccinations they may have missed before completing high school. The program, which is carried out in school-based clinics, allows parents to print out immunization consent forms online and send the completed forms to school with their teens. In the 2013-2014 school year, nearly 11,000 vaccine doses were administered to more than 8,800 students. HPV vaccines were among the most commonly administered vaccines with more than 850 doses provided, second only to the seasonal influenza vaccine.[33]
- Since 2007, the **City of Philadelphia** has allowed minors ages 11 and older to authorize their own immunization without the approval or consent of a parent, guardian or any other representative.[46] Pennsylvania pharmacists, however, cannot provide immunization to minors except for the influenza vaccine.
- **Oregon** allows minors ages 15 and older to consent for immunizations - including HPV vaccines - and general health care. Since 2011, pharmacists in this state are able to give all recommended vaccines with no prescription required for individuals 11 and older.[47]
- In 2012, **California** passed legislation allowing minors 12 years and older to consent to services for the prevention of STIs, including HPV vaccines, without parental consent.[48]

4 INCREASE PUBLIC EDUCATION AND AWARENESS EFFORTS TARGETING PARENTS AND TEENS

While a provider's recommendation may be the strongest predictor of parents' vaccine acceptance, the spread of misinformation from other sources can limit the effectiveness of even the strongest recommendations. To counter the spread of misinformation about vaccines generally, and the stigma surrounding HPV vaccines specifically, it is critical to educate the public with accurate, evidence-based information to help foster productive conversations with health care providers. While studies show that parents are the primary decision makers regarding adolescent vaccines, making information more available to preteens and teens could motivate them to become more active participants in their own health care.[19]

- **States should support efforts to provide outreach and education about HPV risks and the vaccine's benefits in the school environment.**
  - Require schools to distribute information – developed by the state or the CDC – about HPV vaccines to parents of children entering middle school. Some states that utilize such policies are listed below.
  - Require or encourage schools that provide sexual education to include information about HPV and the benefits of the vaccine. Presenting age-appropriate materials about the vaccine in a safe and trusted educational environment can empower adolescents to take charge of their sexual health, encouraging them to participate in – or even initiate – a conversation with their parents or health care provider.
- **States should support general public education and awareness campaigns that appeal to both parents and teens.**
  - In 2013, the CDC provided funding from the federal Prevention and Public Health Fund (PPHF), which was created by the ACA to support national investments in prevention and public health, to 11 state and city immunization programs to conduct several activities to increase HPV vaccination. Activities included the use of reminder and recall systems for girls 11-18 years old and comprehensive, science-based communications campaigns and tools. In 2015, CDC funded the National Immunization Survey to monitor progress and inform programmatic strategies.[49]

EXAMPLES OF STATE LAWS REQUIRING PARENT OR STUDENT EDUCATION ABOUT HPV AND THE VACCINE

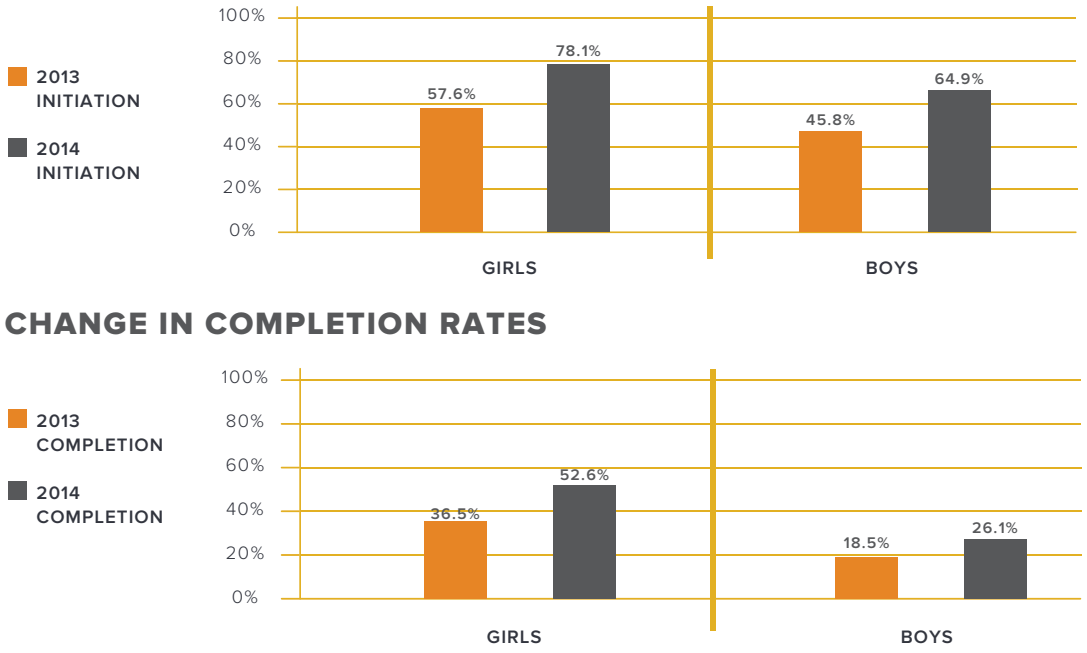
- As of 2007, **Illinois** requires the state Department of Health to provide all rising sixth-grade female students and their parents or legal guardians written information about the link between HPV and cervical cancer and the availability of the vaccine.[20]
- **Indiana** began requiring schools to provide information about HPV and its link to cervical cancer to parents of rising sixth-grade female students in 2007. The state also requires schools to collect written statements from parents indicating their decision about whether they will consent to or refuse the HPV vaccination for their daughters and report this data to the Indiana Department of Health.[20]
- As of 2007, **North Carolina** requires the state Department of Health to distribute information to all parents of children entering grades 5-12 explaining HPV, the availability of the vaccine and where it can be received.[20]
- **Colorado** adopted a requirement to include HPV specific information in schools' sexual education curriculum beginning in 2007.[20]

EXAMPLES OF CITIES WITH PUBLIC EDUCATION AND AWARENESS CAMPAIGNS

Chicago was one of 11 recipients of CDC awarded funding from the Prevention and Public Health Fund (PPHF), and received more than $800,000 to support efforts to increase HPV vaccination rates. The plan included collaboration with a number of community partners, in-person training for medical providers, 22 educational events reaching more than 2,000 health care workers and a citywide public awareness campaign with ads on buses, trains, and broadcast and digital media. The campaign used CDC-developed materials focused on the message of HPV vaccines as cancer prevention for both boys and girls. Chicago saw drastic improvements in HPV vaccination rates from 2013 to 2014, boosting them well above the national average.[50]

FIGURE 6

HPV VACCINATION RATES IN CHICAGO, 2013-2014



SOURCE: Centers for Disease Control and Prevention. National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13–17 Years — United States, 2014. July, 31, 2015.

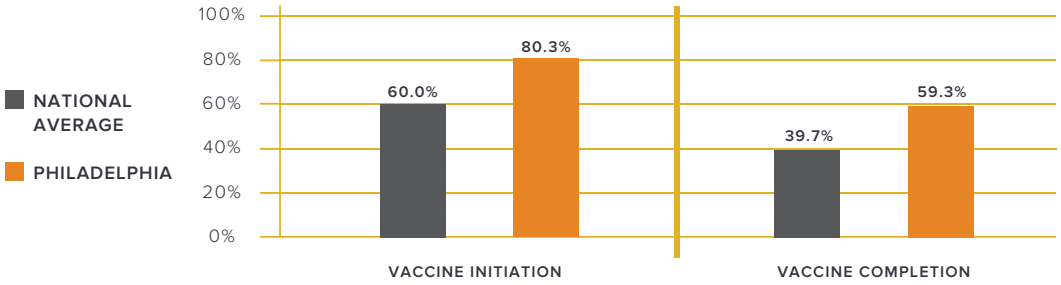
EXAMPLES OF CITIES WITH PUBLIC EDUCATION AND AWARENESS CAMPAIGNS (CONT'D)

Philadelphia received approximately $500,000 in Prevention and Public Health Fund (PPHF) funds from the CDC in 2013, enabling the Philadelphia Health Department to create the HPV Immunization Project, which included provider education and a public media campaign.[31] In August 2014, Philadelphia launched the first phase of its public media campaign, using creative materials provided by the CDC including radio, TV and social media ads, promotional signage on public transportation, direct mailings and automated calls to parents of teens who were not up-to-date on their vaccines. In April 2015, the city health department launched phase two of the media campaign with new materials created in-house, placing a specific emphasis on the importance of HPV vaccination for both boys and girls.[51] In 2014, the City of Philadelphia had the highest rates of female HPV vaccine initiation (80.3%) and completion (59.3%) in the country. The completion rate for boys also had the largest increase of any city or state in the country, rising from 15.8% in 2013 to 34.8% in 2014.[4]

FIGURE 7

HPV VACCINATION RATES FOR ADOLESCENT GIRLS, 2014

IN 2014, PHILADELPHIA HAD THE HIGHEST RATES OF FEMALE HPV VACCINE INITIATION AND COMPLETION IN THE COUNTRY.

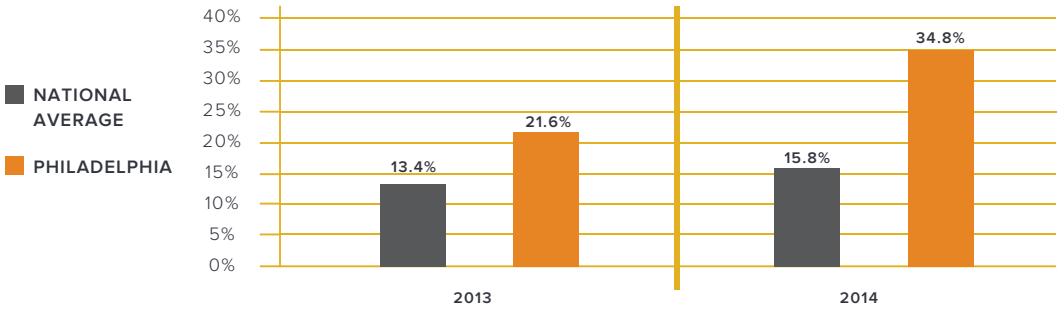


SOURCE: Centers for Disease Control and Prevention. (2015). National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13–17 Years — United States, 2014

FIGURE 8

CHANGE IN HPV VACCINE COMPLETION RATES FOR ADOLESCENT BOYS, 2013-2014

PHILADELPHIA HAD THE LARGEST INCREASE IN COMPLETION RATES FOR BOYS OF ANY CITY OR STATE IN THE COUNTRY.



SOURCE: Centers for Disease Control and Prevention. (2015). National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13–17 Years — United States, 2014

CONCLUSION

HPV vaccines are an effective cancer prevention tool. Just a decade since their introduction, HPV vaccines have already been shown to reduce the prevalence of precancerous lesions in individuals who have been immunized, and have the potential to prevent unnecessary suffering and death for thousands of people.

HPV vaccines are routinely recommended for all adolescents to protect against the virus before potential exposure, but they are treated much differently than other vaccines recommended for the same age group. HPV vaccines' relative novelty, misinformation about their safety and efficacy, the sexual transmission of the infection they prevent and the three doses required for full protection all contribute to the low rates of uptake. Rates of vaccination are slowly rising, but much more should be done to help protect today's children and future generations from preventable and potentially devastating illness.

Stakeholders in different settings can take action now to help increase acceptance and delivery of HPV vaccines. Health care educators can work to ensure that providers have access to training and support at all levels of their career to adequately prepare them for difficult conversations with vaccine hesitant parents. Health care providers can utilize supportive tools and additional training to help capture commonly missed vaccination opportunities and increase HPV vaccine completion rates in their own practices. States and cities can work to implement policies that reduce or eliminate physical and financial barriers to accessing HPV vaccines. And finally, states, cities, health care networks and schools can collaborate to increase accurate, evidence-based education and awareness for parents and teens about HPV and the available vaccines.

Each of these methods has seen success during targeted initiatives. Making HPV vaccination a priority for adolescent health care and scaling up these initiatives will help to protect young men and women throughout their lives and for generations to come.

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