

COMMENTARY



Policy opportunities to increase HPV vaccination in rural communities

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ABSTRACT

Rural communities experience health disparities, including elevated incidence and mortality of human papillomavirus (HPV)-associated cancers and correspondingly low HPV vaccination rates. There are numerous policy strategies that are available at multiple levels – patient, provider, clinic, community, state, and national – to address geographic, clinical, and communication barriers to HPV vaccination across rural America. Examples include policy development, implementation, and evaluation of health-care provider and clinic-based assessment and education initiatives; school entry requirements; school, pharmacy, and community-based vaccination programs; evidence-based, community-driven communication efforts; and increased interventional research in rural communities. Strategically implemented policy measures will contribute to reduction in the incidence and mortality from HPV-related cancers through increased access to HPV vaccination in our rural communities.

ARTICLE HISTORY

Received 11 October 2018
Revised 6 November 2018
Accepted 21 November 2018

KEYWORDS

Cancer prevention; HPV vaccination; public health policy; rural; vaccination

Commentary

Since licensure in the United States (U.S.) in 2006, the human papillomavirus (HPV) vaccine has been shown to be a safe, effective, and durable method for decreasing HPV-related infections and subsequent sequelae, including genital warts and cervical, vulvar, vaginal, penile and anal cancers¹ and potentially oropharyngeal cancers.² Routine HPV vaccination is widely recommended for age- and guideline-eligible male and female adolescents and young adults by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices³ and the U.S. Food and Drug Administration recently revised their approval for the HPV9 vaccine to include adults aged 27–45.⁴ HPV vaccination is covered by the federally sponsored Vaccines for Children (VFC) Program and private insurance plans as required by the Affordable Care Act. Yet, more than 12 years after licensure, national uptake of HPV vaccination remains low. In 2017, completion of the HPV vaccine series (up-to-date [UTD]) was 49% (53% among females, 44% among males), failing to meet the Healthy People 2020 goal of vaccinating 80% of adolescents aged 13–15.⁵ In contrast, uptake for other adolescent vaccines introduced around the same time (MenACWY in 2005, Tdap in 2006) is much better. In 2017, Tdap was 89% and one dose of MenACWY was 85%.⁵ Lower uptake of HPV vaccination represents missed opportunities for timely cancer prevention for adolescents in general, but may also magnify HPV-related cancer disparities experienced by the 20% of Americans who live in rural communities.⁶

Recent findings by Zahnd et al. suggest that rates of HPV-related cancer are higher in rural areas compared to urban communities.⁶ From 1995 to 2013, rates of HPV-related cancers in rural regions had a significant annual percentage

change of nearly 0.80%.⁶ Ware et al. (2017) also found that approximately one-third of their rural sample (i.e., females residing in Appalachian Kentucky) tested positive for at least one high-risk strain of HPV.⁷ Additionally, increased rates of high-risk HPV infections and HPV-related cancers have been found in rural areas with high poverty.^{6,7}

There is incongruence of low HPV vaccination coverage in geographic regions with high HPV-associated disease, thereby exacerbating disparities in cancer outcomes. Specifically, adolescents in rural areas are less likely to be vaccinated against HPV than those in urban areas.^{5,8,9} Recent 2017 CDC data confirm that UTD HPV vaccination rates among adolescents in rural areas were 10% lower in comparison to urban communities (42% vs. 52%, respectively).⁵ In addition, states with high proportions of rural-designated counties located throughout the Southern, Midwest, and Western U.S. have the lowest UTD HPV vaccination rates in the U.S. (range: 28.8–48.5%).⁵ Rural states such as Arkansas, Kentucky, and Ohio also illustrate the discordance of low HPV vaccination rates and elevated cervical cancer incidence mortality.^{5,10,11} Low rates of HPV vaccination may be due to myriad barriers faced by rural residents, including geographical and socioeconomic barriers to accessing preventive healthcare services,¹² lack of provider recommendation,¹³ limited awareness of HPV and the vaccine among the public, along with negative community messaging,¹⁴ lack of knowledge regarding HPV's link to cancer,¹⁵ and fatalistic beliefs and cultural views that may not support HPV vaccination.^{16,17} Additionally, there are few widely available evidence-based HPV vaccination interventions focused on rural communities.¹⁸

To remove such barriers and increase HPV vaccination in rural areas, policy measures are needed with the ultimate goal of decreasing related cancer disparities. We conceptualize

policy change to occur across multiple levels with the necessary engagement of multiple stakeholders. We broadly characterize policy opportunities using “big P” and “little p” designation, understanding that both have the potential to influence HPV vaccination. As a strategy for acknowledging the local level influence of policy, we utilize the notion of “big P” policy change as constituting governmental policy change, such as at the federal and/or state level,¹⁹ for example, through expanded federal funding of state-level vaccination programs and requirements for school entry at the state level. “Big P” policy change usually requires approval of elected officials and may be more difficult to influence. Whereas “little p” policy change occurs within a system to influence organizational practices,¹⁹ such as a primary care practice instituting standing orders for the first HPV vaccination dose in the office and subsequent doses in a local pharmacy. “Little p” policy change may be more accessible to incur change and the effects more immediate, particularly in rural areas. Therefore, the purpose of this commentary is to discuss multilevel policy recommendations for increasing effective delivery of HPV vaccination in rural communities. **Table 1** provides an overview of policy opportunities, level of policy target, and designation as “big P” or “little p.”

Policy opportunities to address barriers among providers and in the clinical setting

As noted in the 2012–2013 and 2018 President’s Cancer Panel reports on HPV vaccination, a patient’s medical home is the ideal place for vaccination as it allows for the provision of additional preventive care and direct communication with providers.^{9,20} For many rural residents, however, having a designated medical home may not be feasible; many rural counties are designated as health professional shortage areas in general, and specifically related to primary care and oral health services.²¹ Shipman et al. found that areas with a low supply of healthcare providers for children were concentrated in rural regions of the U.S.²² Primary care providers in rural areas may a diverse patient population (i.e., children,

adolescents, adults, geriatric) and conditions (e.g., acute problems, chronic diseases, mental health), and may be less knowledgeable about adolescent vaccination recommendations, including HPV vaccination²³; they also may not be able to keep guideline-recommended vaccines readily stocked in their clinic.²³

Given that a provider recommendation is one of the primary reasons patients (and parents) initiate a preventive measure, including vaccination, it is troubling that many healthcare professionals practicing in rural communities vary in their recommendation for HPV vaccination, including not recommending it at all. Moss et al. (2016) found that underserved populations, including those residing in rural areas, were the least likely to report collaborative communication with their provider about HPV vaccination.¹³ Furthermore, patient-provider communication was found to have a moderating effect on rural females, suggesting that such communication can help remove obstacles to HPV vaccination among this population.¹³ In addition, Kepka and colleagues found that rural youth in Utah were more likely to have a missed opportunity for HPV vaccination (i.e., a clinical encounter where the patient received at least one adolescent vaccination, but not a HPV vaccine) compared to their urban counterparts.²⁴

Healthcare provider recommendations and decreases in missed immunization opportunities are “little p” policies with the potential to influence patients seeking care at their facilities as well as the larger community. When rural Americans can access healthcare settings and interact with providers, multiple “little p” policy opportunities emerge. First, “little p” policies to ensure all eligible patients have providers who are delivering strong and consistent recommendations for HPV vaccination²⁵ in a supportive clinical setting, such as through the creation of HPV vaccination reminder and recall systems within the electronic medical record for both the initial dose and sequent doses,^{9,26} participation in state immunization registries that maintain all vaccination records, and provision of HPV vaccination educational materials.¹¹ Second, implementation of standing

Table 1. Summary of policy opportunities to increase HPV vaccination in rural areas.

| Policy Opportunity | Description | Level | Big “P”/Little “p” |
|--|---|-------------------|--------------------|
| Healthcare provider recommendation | HPV vaccination recommendation to patients at each visit, particularly when other vaccines are being administered; decreases missed opportunities. | Provider | Little “p” |
| Reminder and recall systems | Reminders within the electronic medical record, prompting providers to initiate HPV vaccination recommendation; patient reminders to initiate and/or complete the HPV vaccine series. | Clinic | Little “p” |
| State immunization registries | Statewide registries in which all immunization records are entered and maintained. | State | Big “P” |
| Standing orders | Official clinic protocols that give clinical staff authorization to complete immunizations for patients meeting recommended guidelines. | Clinic | Little “p” |
| Provider assessment and feedback evaluations | Routine feedback to providers on patients’ HPV vaccination series initiation and completion rates. | Clinic | Little “p” |
| Participation in VFC Program | Clinic approval and implementation of processes that allow for participation in the VFC Program. | Clinic | Little “p” |
| Vaccination in alternative settings | Providing HPV vaccination programs in schools, pharmacies, mobile clinics, dental practices, and other community-based, non-medical settings. | Clinic, Community | Little “p” |
| Pharmacy-related laws | State-enacted laws allowing pharmacists to provide the HPV vaccine series to youth and young adults. | State | Big “P” |
| School-entry requirements | State-enacted laws that require students to initiate and complete the HPV vaccine series to maintain eligibility to attend school. | State | Big “P” |
| Communication campaigns | Leveraging rural community partnerships and voices of local residents to deliver positive HPV vaccination messaging. | Community | Little “p” |
| Rural HPV vaccination research | Increased funding for interventional rural HPV vaccination research (e.g., randomized controlled trials, quasi-experimental studies, and pragmatic trials). | National | Big “P” |

orders that empower clinical support staff to proactively provide HPV vaccination^{9,25} and regular conduct of assessment and feedback evaluations with providers and clinics to monitor patient vaccination rates²⁷ are evidence-based strategies proven to improve HPV vaccination outcomes.

Lastly, it is vital that rural safety net providers, such as federally qualified health centers, rural health clinics, and local health departments, participate in the VFC Program, which provides HPV vaccination at no cost to Medicaid-eligible children.²⁸ Participation in the VFC Program has been historically low in rural areas and southern states.²⁹ The VFC Program offers critical access to vaccinations for rural residents and offers a tool for healthcare providers and pharmacies to expand access to free vaccines.

Policy opportunities to address geographic barriers at the community and state level

Recognizing that geography, distance, and access to care are challenges for rural communities, the President's Cancer Panel also recommended that additional venues outside the medical home be used to increase the likelihood of initiation and completion of the HPV vaccination series.^{9,20} In line with the Panel's recommendations, there are several examples of policy-related initiatives to increase HPV immunization rates through vaccine provision in alternative settings, such as through pharmacies, schools, and other community-based, non-medical settings.

At the local level, pharmacy-based HPV vaccination programs have shown to be promising. Pharmacists play a pivotal role in rural areas as they may be one of the few healthcare providers in their area, and serve a key function in providing accurate medical information to their patients.³⁰ For example, the University of Kentucky (UK) partnered with a pharmacy in rural eastern Kentucky to implement a pilot project aimed at increasing HPV vaccination rates.³¹ The UK research team provided continuing education to pharmacists on HPV vaccination guidelines and best practices for increasing uptake; a reminder system, patient log, and community education/marketing materials were also developed for the project. Overall, the project was successful in initiating HPV vaccination among adolescents in the community and educating residents about HPV and the importance of vaccination. It also highlighted policy-related challenges of pharmacy-based vaccination programs that should be addressed in the future, such as reimbursement for vaccinations delivered by pharmacy staff and implementation of the VFC Program in pharmacies.³¹

Pharmacy-based policies can also be focused at the state-level. As of January 2016, 40 states had enacted laws allowing pharmacists to provide the HPV vaccine series to patients. However, laws allowing pharmacists to administer HPV vaccination to the targeted age-range (i.e., aged 11–12) have only been enacted in 22 states.³² State-level policies that do not support vaccination of the guideline-recommended age-group are a missed opportunity to decrease HPV vaccination care gaps, particularly in rural states.

Another opportunity to help eliminate geographic, distance, and travel burdens are school-based HPV vaccination programs. A recent systematic review found that school-based HPV vaccination programs can improve access to the vaccine despite one's traditional healthcare access.³³ Other countries have found success in achieving high HPV vaccination rates through the use of such programs.^{33,34} For example, a school-based vaccination program in Prince Edward Island, Canada achieved identical rates of high HPV vaccination uptake in both urban (82%) and rural schools (82%).³⁴ Findings from Walling et al. (2016) suggest that HPV vaccination programs in the U.S. could attain high vaccination rates and provide such services for students in underserved areas.³³ To date, there have been some U.S.-based school vaccination programs in rural areas that have been successful in improving HPV vaccination rates. In rural Kentucky, across two high schools, 88% of students who initiated HPV vaccination completed the full series.³⁵ In rural North Dakota, HPV vaccination programs were placed in 20 middle and high schools; by the end of the first year, HPV vaccination rates had increased by at least 10%, exceeding established goals.³⁶

However, school-based programs are not commonly used for adolescent vaccination in the U.S., including HPV.³⁷ Like pharmacy programs, school vaccination programs face similar challenges, including reimbursement for administering the HPV vaccine. For example, if a school-based program is not able to appropriately bill insurance companies to cover vaccination costs, then only VFC program-eligible students can be vaccinated.³⁷

Another "Big P" policy option is to require HPV vaccination for school entry, which could positively impact rural states. Currently, HPV vaccination is required for school attendance in three jurisdictions: District of Columbia (D.C.), Virginia, and Rhode Island.³⁸ Notably, Rhode Island and D.C. both achieved UTD HPV vaccination rates of 78% among adolescents in 2017⁵; Rhode Island in particular has seen significant improvements in male vaccination rates following implementation of the school entry requirement.³⁹ One main challenge for requiring school entry HPV vaccination is that opt-out provisions may weaken the overall effectiveness of such policies.²

Lastly, mobile immunization clinics⁴⁰ and dental practices⁴¹ may also serve as an innovative means to increase HPV vaccination in rural communities. Mobile immunization clinics have shown promise when coupled with offering other services that result in interest by parents of adolescents as well as adults eligible for vaccination. Dental practices have also emerged as untapped settings in terms of recent American Dental Association guidelines recommending dentists educate themselves and their patients about the link between HPV and oropharyngeal cancer as well as for dentists to provide adult patients with thorough hard-tissue and soft-tissue examinations, including lymph node exams, following completion of the patient's health history and risk assessment.⁴² Challenges for mobile clinics and dental practices may include infrastructure for HPV vaccine ordering and storage, tracking and reporting to immunization registries, and insurance coverage, in addition to patient-centered barriers and acceptance. Community-based, non-medical strategies to increase HPV vaccination access through pharmacies, schools, mobile clinics, and/or dental practices may be particularly effective

in rural settings where traditional access to healthcare is often limited.

Policy recommendations related to communication about the HPV vaccine

Since its introduction, the HPV vaccine has been met with controversy due to moral, religious, political, medical, gendered, and sociocultural beliefs^{43,44} that may be magnified in rural communities. Early messaging about the vaccine focused on HPV as a sexually transmitted infection, causing providers and parents to feel uncomfortable discussing the vaccine. Even though recent messaging has shifted to the vaccine's cancer prevention benefits, controversial aspects of HPV vaccination still remain, including safety concerns, despite data supporting its safety and efficacy. Prior research has identified deficits in awareness and knowledge of HPV among rural populations, including knowledge about the causal link between HPV and cervical and oral cancers.^{12,14,15} In turn, national health agencies such as CDC and the National Area Health Education Center Organization have initiated messaging and programming to promote improvements in rural health, including HPV vaccination, among providers and patients.^{23,45} Localized health communication campaigns in rural communities are also powerful when leveraging community partnerships and voices of local residents to deliver positive HPV vaccination messaging.³⁵

Policy recommendations for increasing HPV vaccination research in rural communities

To date, there have been numerous rural-focused HPV vaccination research studies that have employed qualitative research, observations, surveys, and secondary data analyses to understand HPV and vaccine-related knowledge and attitudes, vaccine acceptability and intentions, vaccine communication and messaging, barriers to uptake and completion, and HPV vaccination rates. However, a recent narrative review conducted by Brandt and Vanderpool suggests a paucity of interventional rural HPV vaccination study designs (e.g., randomized controlled trials, quasi-experimental studies, pragmatic trials) (personal communication, R Vanderpool). Related, only six evidence-based HPV vaccination interventions have qualified for inclusion in the National Cancer Institute's (NCI) Research Tested Intervention Programs database on Cancer Control P.L.A.N. E.T., of which only two include a focus on rural populations.¹⁸ More research is needed given the results of NCI's Division of Cancer Control and Population Sciences recent funding portfolio analysis wherein only 3% of their R-mechanism grants focused on cancer control in rural populations across a 5-year period (2011–2016); only one of which focused on HPV vaccination.⁴⁶ Current national initiatives, including the Cancer MoonshotSM Blue Ribbon Panel's prioritization of increasing access to evidence-based cancer prevention strategies such as HPV vaccination⁴⁷ and NCI's focus on accelerating rural cancer control research⁴⁸ and HPV vaccination research among designated cancer

centers and the extramural research community,⁴⁹ will hopefully contribute to improved HPV-related and rural health outcomes across the U.S.

Conclusion

Rural communities shoulder a disproportionate burden of health disparities, including low HPV vaccination rates and elevated incidence and mortality of HPV-associated cancers. As described throughout this commentary, there are numerous “big P” and “little p” policy strategies that are available – yet underutilized – at multiple levels to impact geographic, clinical, communication, and research-related barriers to HPV vaccination in our rural communities. Implementation of these policies at the patient, provider, clinic, community, state, and national levels would ultimately contribute to meaningful reductions in the burden of HPV-related cancers in rural America. Most of these policy opportunities are at the local level providing an ideal setting in which to enact impactful, meaningful change. Additional insight will be needed to determine effective policy development, implementation, and evaluation strategies for HPV vaccination in rural areas. However, the time to act is now in order to reduce rather than exacerbate HPV-related disparities among rural Americans.

Disclosure of potential conflicts of interest

Dr. Heather Brandt is a member of the Merck US HPV Advisory Board. There are no other conflicts of interest to report.

Funding

This commentary is the result of work conducted by two of the Cancer Prevention and Control Research Network sites funded by the Centers for Disease Control and Prevention (CDC) and the National Cancer Institute (NCI). The research was supported by the following cooperative agreements from the CDC's Prevention Research Centers (PRC) Program and the NCI. The findings and conclusions in this manuscript are those of the authors and do not necessarily represent the official position of the CDC and NCI.

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