What Are the Barriers and Facilitators to Improving Virginia's HPV Vaccination Rate? A Stakeholder Analysis

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Disclaimer

The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Air Force, the Department of Defense or the U.S. Government.

Abstract

Background: Despite the evidence, the availability since 2006, and strong recommendations from many professional organizations, the human papillomavirus (HPV) vaccines have had low completion rate: 39.7% for girls and 21.6% for boys nationally and 35.9% for girls and 22.5% for boys in Virginia. These rates are far below the Healthy People 2020 goal of 80% and many adolescents are at risk for developing HPV-related cancers and infections.

Purpose: The purpose of this study is to identify barriers and facilitators to improving the HPV vaccination rate in central and southern Virginia.

Method: Semi-structured key informant interviews, with purposive sampling of 31 stakeholders, were conducted to identify their opinions regarding barriers and facilitators.

Results: Analysis of the interviews revealed barriers at all levels: Knowledge gaps and sexuality concerns at the parent-child dyad level, time constraint and inconsistent recommendation at the interpersonal level, lack of leadership and informational support at the organizational and community level, and an ineffective mandate at the policy level. Facilitators identified are realistic and receptive attitude at the parent-child dyad level, provider's strong recommendation and educational support at the interpersonal level, team approach and useful data at the organizational level, educational outreach and community resources at the community level, and support from federal and professional organizations at the policy level.

Conclusion: The stakeholder analysis provided an environmental scan of the barriers and facilitators so that an effective HPV vaccination strategy can be planned and implemented in the Commonwealth of Virginia.

Keywords: HPV vaccines, barriers, facilitators, socio-ecological model, Virginia, stakeholders

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Section I: Introduction and Research Question

Every 20 minutes, an American is diagnosed with a human papillomavirus (HPV)-associated cancer, and most are acquired in people in their teens and 20s (Centers for Disease Control and Prevention [CDC], 2014a). With more than 79 million individuals infected and 14 million new cases each year, HPV infection is the most common sexually transmitted infection in the United States (Satterwhite et al., 2013). While most cases resolve spontaneously, persistent infections with HPV types 6, 11, 16 and 18 are most concerning because these lead to 26,000 new cancer cases and 90% of anogenital warts (CDC, 2012). Of the different types of cancer, HPV types 16 or 18 account for 66% of cervical cancers, 55% of vaginal cancers, 79% of anal cancers, and 62% of oropharyngeal cancers (CDC, 2012). According to the Surveillance and Epidemiological and End Results (SEER, 2015) database, 12,900 new cervical cancer cases with 4,100 deaths are anticipated for 2015. The annual burden of HPV-related treatment for women is 3 million cases at a cost of $7 billion (CDC, 2015).

To counter this statistic, three effective and safe vaccines are available and recommended by the Advisory Committee on Immunization Practices (ACIP) for all young women ages 9 to 26, and two vaccines are available to young men ages 9 to 21 (CDC, 2007, 2010; Petrosky et al., 2015). Furthermore, the Association of Women's Health, Obstetric & Neonatal Nursing (2010), and in a "Dear Colleague" letter (2014), the American Academy of Family Physicians (AAFP), American Academy of Pediatrics (AAP), American College of Obstetricians and Gynecologists (ACOG), American College of Physicians (ACP), the Centers for Disease for Control and Prevention (CDC), and Immunization Action Coalition have unanimously endorsed the HPV

vaccination series. Furthermore, 69 top cancer centers issued a joint statement advocating for increased HPV vaccination (NCI-designated Cancer Centers, 2016). Despite this, the initiation and completion rate of HPV vaccination series nationally in 2014 is only at 60.0% and 39.7% for girls, 41.7% and 21.6% for boys respectively (Reagan-Steiner et al., 2015). In Virginia, the rate is 59.2% for initiation and 35.9% completion for girls, and 36.3% initiation and 22.5% completion for boys (Reagan-Steiner et al., 2015). The completion rate nationally and in Virginia is far below The Healthy People 2020 goal of 80% for all three injections (United States Department of Health and Human Services [HHS], Healthy People 2020, 2011). In short, many adolescents are not getting their HPV vaccines, and many young men and women are still at risks for developing this highly preventive cancer and infection.

Virginia is unique because, in 2008, it was the first state to mandate HPV vaccination for girls entering middle school (National Conference of State Legislatures, 2015). However, this legislation has faced numerous threats of appeal, and many experts have criticized its opt-out policy as being too generous (Osazuwa-Peters, 2013; Pitts & Adams Tufts, 2013). To further explore the effects of HPV vaccination mandates, Colgrove, Abiola, and Mello (2010) interviewed 73 key informants from six states, ten of whom were from Virginia. They found eight factors that impeded adoption of successful school mandates: five relating to characteristics of the HPV vaccine (newness of vaccine, sexually transmitted nature, not contagious in classroom setting and thus the generous opt-out in Virginia, involvement of vaccine's manufacturer, and cost concerns) and three relating to the vaccine policymaking process in general (inappropriateness of mandate within a few months of vaccine licensure, mandate without adequate public support and so "end up backfiring and hurting....encouraging parents to opt out more", and suboptimal venue for legislative process) (p. 790). There has been

only one published, qualitative study (Pitts & Adams Tufts, 2013) addressing parental response to the Virginia HPV vaccination mandate. Parents in the study described less trust in the vaccine because of the mandate.

The Purpose of the Study

The purpose of this study is to identify barriers and facilitators to HPV vaccination using the socio-ecological model as a conceptual framework for improving HPV vaccination initiation and uptake in young men and women ages 9 to 26 in the University of Virginia Cancer Center's catchment area (Figure 1). Since many counties in the catchment area are defined as "rural" per the Health Resources and Service Administration (HRSA) as well as "medically underserved", the search focuses on information that may be applicable to a rural setting in Virginia. The data from this study will provide an environmental scan so that future programs can be developed to improve the HPV vaccination rate in Virginia.

Research Question

What are the barriers and facilitators to improving Virginia's HPV vaccination rate?

Theoretical Framework

Lagging HPV vaccination rates arise from several factors. The socio-ecological model (SEM) posits that complex interactions at the intrapersonal, interpersonal, organizational, community, and public policy levels shape health behavior (McLeroy, Ribeau, Steckler, & Glanz, 1988). Individual knowledge, attitude, and skills are shaped by interpersonal interactions with family, friends, and social network. For the adolescent, health care decision is often tied to the parent and labeled as "Parent-child dyad" at the intrapersonal level. Public policy, community support programs, and institutional processes further impact HPV vaccination. To better understand barriers and facilitators to HPV vaccination, the interactions between these

levels are examined as noted in Figure 2.

Section II: Review of the Literature

The key search terms used to compile this literature review are *human papillomavirus (HPV) vaccines*, *HPV vaccination*, *barriers*, *facilitators*, *Virginia*, and *rural*. The following databases were explored from the years 2011 to June 2015: Ovid MEDLINE, CINAHL, Cochrane Database of Systematic Reviews, and Science Direct. Secondary searches were also performed on the reference lists of potentially relevant literature. Inclusion criteria were 1) any studies that utilize population-based data, 2) literature review, systematic review of studies performed in the United States (USA), 3) any study in a rural setting. Exclusion criteria were 1) any studies conducted outside the USA or exclusively in urban settings. The literature search method is shown in Figure 3 and a summary of the findings is presented in Table 1.

A few themes emerged from this literature review. The most common barriers were cost (Ferrer, Trotter, Hickman, & Audrey, 2014; Garcini, Galvan, & Barnack-Tavlaris, 2012; Rambout, Tashkandi, Hopkins, & Tricco, 2014; Kessels et al., 2012), individual/parental barriers (Kessels et al., 2012; Rambout et al., 2014; Head et al., 2013; Ferrer et al., 2014; Garcini et al., 2012; Bartlett et al., 2011), lack of health care providers' recommendations at the interpersonal level (Bartlett et al., 2011; Head et al., 2013; Ferrer et al., 2014; Rambout et al., 2014; Jeudin et al., 2014; Garcini et al., 2012; Kessels et al, 2012), and health disparities (Rahman et al., 2013; Garcini et al., 2012; Gelman et al., 2013; Jeudin et al., 2014; Kessels et al., 2012) . Strong facilitators of HPV vaccination included health care provider's recommendations (Ferrer et al. 2014; Garcini et al., 2012; Kessels et al., 2011; Rambout et al., 2014; Jeudin et al., 2014); free HPV vaccines (Ferrer et al., 2014; Garcini et al., 2012; Kessels et al., 2011), and positive vaccine attitudes held by parents and young adults (Garcini et al., 2012; Kessels et al., 2011; Ferrer et al.,

Rambout et al., 2014). The interactions of the various levels of the socio-economical model showed that overall, women who live in the South (Rahman et al., 2013), have low-income (Jeudin et al., 2014), and are of racial/ethnic minorities (Kessels et al., 2011; Gelman et al., 2013; Jeudin et al., 2014) were less likely to initiate and/or complete the vaccination series.

Individual Barriers

Individual barriers included issues of consent, knowledge and beliefs. Adolescents under 18 require parental consent for HPV vaccination so the parent usually controls consent. Kessels et al. (2012) conducted a systematic review of HPV vaccine uptake in teenage girls. Girls who had been vaccinated have a significantly higher knowledge score about HPV, HPV-vaccination and cervical cancer, compare to non-vaccinated girls in three studies. However, when parental characteristics, social influences, and sources/quality of information were controlled, there was no significant effect on the reported knowledge level. Rambout et al. (2014) found three studies that examined adolescent decision-making regarding vaccination. When adolescents were not sexually active or perceived HPV risk to be low, they were less likely to believe there was a need for vaccination.

According to ta systematic review by Rambout et al. (2014), most of the studies on individual barriers were conducted with women over the age of 18. This age group's primary concern was cost, followed by belief that the vaccine was unnecessary. Additional barriers included problems with making an appointment, arranging transportation, and remembering to get all three doses. These barriers appeared to be particularly relevant among ethnically diverse and low-income populations. Other concerns noted in this review and elsewhere, included safety and side effects (Rambout et al., 2014; Head et al., 2013).

Interpersonal Barriers

Parental influences played major roles in adolescent's HPV vaccination especially in the young adolescent, but to a lesser extent in the young adults (Ferrer et al., 2014; Garcini et al., 2012; Kessels et al., 2012; Head et al., 2013; Bartlett et al., 2011; Rambout et al., 2014). Ferrer et al. (2014) found that social norms and cultural/religious values related to sexuality could deter vaccination in adolescents up to age 18. Other parents have concerns about the vaccines' safety, side effects, and held the perceptions that the vaccines were unnecessary especially in the young adolescent since they were not sexually active (Rambout et al., 2014; Garcini et al., 2012; Kessels et al., 2012; Bartlett et al., 2011; Head et al., 2011). In the National Immunization Survey – Teen (NIS-Teen), the top 5 reasons for non-vaccination were lack of knowledge, not needed or necessary, safety concern/side effects, no recommendation by health care providers, and not sexually active (Stokley et al., 2014).

A provider's strong recommendation was a major facilitator toward vaccination and a lack thereof was a major barrier (Bartlett et al., 2011; Head et al., 2013; Ferrer et al., 2014; Rambout et al., 2014; Jeudin et al., 2014; Garcini et al., 2012; Kessels et al., 2012). Having a provider as a source of information can counter many of the barriers described at the parental/adolescent level (Kessels et al., 2011). Furthermore, Jeudin et al. (2014) reported that a provider's recommendation appeared to be more important than race or socioeconomic status in determining vaccination receipt. Finally, Garcini et al. (2012) found that having a provider's recommendations for the vaccine was the strongest predictor of vaccine initiation.

Community Barriers

According to the CDC (2014b), health disparities are preventable differences in the burden of disease or opportunities to achieve optimal health that is experienced by socially disadvantaged populations. Population factors such as race or ethnicity, gender, education or

income, geographic location were directly related to the historical and current unequal distribution of social, political, economic, and environmental resources (CDC, 2014b). Health disparities were noted in this study at the community and policy level.

For HPV vaccination, health disparities seemed to exist in low-income and minority groups especially women living in the South. Rahman et al. (2013) used the data from Behavioral Risk Factor Surveillance System from 2008-2010 and found that women living in the South were less likely to initiate or complete the vaccine series. The causes of these differences need to be further explored. Garcini et al. (2012), however, showed inconsistent results with racial/ethnic differences for studies from 2006-2012. Gelman et al. (2013) used the National Survey of Family Growth from 2008-2010 and noted that US-born Hispanics, foreign-born Hispanics, and African Americans were less likely than Whites to initiate HPV vaccination. Kessels et al. (2012) found that African American girls were less likely to initiate or complete the 3-dose series. Jeudin et al. (2014) found that according to the 2011-2012 data that low-income and minority adolescents were equally or more likely to initiate HPV, but they were less likely to complete vaccination series. Rural communities also struggle with low HPV vaccination rate and high cervical cancer rate. A study in Kentucky (Crosby, Casey, Vandepool, Collins & Moore, 2011) found a 7-fold decrease in rural women versus urban women returning for a follow-up vaccine doses despite the vaccine being free of charge.

Policy Barriers

Four systematic reviews (Ferrer et al., 2014; Garcini et al., 2012; Rambout et al., 2014; Kessels et al., 2012) cited cost as major factors for HPV vaccination barriers. Ferrer et al. (2014) identified the barrier as “financial consideration” and recommended a health care system that offers free HPV vaccine at the point of service as a way to overcome the financial barriers. The

study noted that health care professionals indicated the high price, lack of health care insurance, and inadequate insurance reimbursement as barriers to uptake (Ferrer et al., 2014). Rambout et al. (2014) studied the self-reported barriers/facilitators. They noted that cost was the most frequently reported barrier of the 21 barriers identified. Garcini et al. (2012) categorized insurance as an access-related factor, which was mentioned in 88% of the studies. Kessels et al. (2012) noted that higher vaccine uptake was associated with having health insurance. Jeudin et al. (2014), however, commented that despite cost barriers, low-income and minority adolescents were more likely to initiate the vaccine series, but are less likely to complete all three.

Each HPV vaccination injection costs $130 to $150, for a total of around $390 to $450 for the series (Association of Reproductive Health Professionals [ARHP], 2015). Most private insurances cover the vaccination series, and the federal Affordable Care Act (ACA) requires all new private insurance plans to cover recommended preventive services without consumer cost-sharing (Henry J. Kaiser Family Foundation [KFF], 2015). Public financing for the vaccine includes the Vaccine for Children (VFC) Program for children age 18 and younger, Immunization Grant Program (Section 317) for children who do not qualify for VFC, Medicaid, and state Children's Health Insurance Program (CHIP) (KFF, 2015). Finally, for individuals over 19 who have no health insurance and cannot afford their vaccines, Merck offers free vaccines under the Vaccine Patient Assistance Program (Merck, 2015).

This literature review explored barriers and facilitators to HPV vaccination in the United States with a special focus on rural settings. Among the ten studies that met criteria for review, common barriers to HPV vaccination include cost, individual/parental barriers, lack of recommendations from providers, and health disparities. Strong facilitators include provider's recommendation, free HPV vaccine at the point of care, and positive vaccine attitudes. The

findings provide a literature scan of barriers and facilitators that may explain Virginia's lagging HPV completion rate. There is currently no published study that has evaluated the barriers and facilitators to improving Virginia's HPV vaccination rate. This study aims to answer the question, "What are the barriers and facilitators to improving Virginia's HPV Vaccination rate?"

Section III: Methods

Despite the availability of HPV vaccines and legislation to mandate vaccination, Virginia's HPV completion rate is below the national average. The literature review showed various barriers and facilitators, however, there has only been one study that evaluated Virginia's lagging HPV vaccination rate (Pitts & Adams Tufts, 2013). The purpose of this study is to identify barriers and facilitators of the current vaccination system to improve Virginia's HPV vaccination rate.

Definition of Terms

The following terms are defined as indicated:

Rural: All counties that are not designated as parts of Metropolitan Areas (MAs) by the Office of Management and Budget (OMB) (HRSA, 2010).

Medically underserved areas (MUA): Service areas that score 62.0 or less on the Index of Medical Underservice (IMU) according to HRSA (2010)

Health care providers (HCP): Health professionals who interact directly with patients as a team to provide HPV vaccination. These include nurses, officer managers, pediatricians, gynecologists, and nurse practitioners.

Stakeholders: Anyone involved with policy and/or care related to HPV vaccination and cancer outreach. Examples of stakeholders are nurses, pediatricians, gynecologists, oncologists, nurse practitioners, pharmacists, epidemiologists, health educators, and representatives from the

Virginia Department of Health, local health departments, Women's Health VA, Virginia Academy of Family Physicians, American Academy of Pediatrics, College of Obstetricians and Gynecologists, and Virginia Council of Nurse Practitioners.

Parent-Child Dyad: Traditional SEM has the parent at the interpersonal level and the child (the patient) at the intrapersonal level. This term is used to describe the strong parental involvement in the decision for vaccination for children under 18 years of age at the intrapersonal level. For those over 18 years of age, Intrapersonal is still used.

Research Design

This is a descriptive study.

Description of the Sample

A purposive sampling technique was used to identify stakeholders involved with aspects of care related to HPV vaccination or cancer outreach. Individuals not involved in HPV vaccination or cancer outreach were excluded. Forty-two emails were sent to stakeholders requesting interview. Snowballing sampling technique was used to identify additional stakeholders. At the conclusion of the study, twenty-eight interviews with 31 stakeholders (74% participation rate) were conducted over the phone or in person. The interviews occurred individually or in a group setting. Stakeholders were identified as registered nurses or nurse practitioners (n=7), medical doctors (n=7; with specialty in pediatrics, family practice, gynecology, oncology, and pathology), pharmacy or industry (n=5), health department (n=5), community programs (n=6), and professors (n=4). Since stakeholders had multiple roles, the roles identified do not equal to 31. The stakeholders had an average of 12.5 years of experience, with a range of one month to 48 years of experience or in their current position. Stakeholders

represented public and private institutions. Ten stakeholders provided direct patient care with regard to HPV administration and/or education.

Setting

The UVA Cancer Center's primary service area is within Central Virginia, and secondary service areas include Southwest Virginia and West Virginia (Figure 1). The primary service area includes the cities of Charlottesville, Staunton, and Waynesboro, plus the counties of Albemarle, Augusta, Fluvanna, Greene, Louisa, Nelson, and Orange. The secondary service area is defined as the counties of Amherst, Appomattox, Buckingham, Campbell, Culpeper, Fauquier, Madison, Page, Rappahannock, Rockbridge, Rockingham, Shenandoah and Warren, plus the incorporated cities lying therein (University of Virginia Health System, 2014). Most counties in the primary and secondary service areas were identified as "rural" per HRSA and "medically underserved."

This study supports the grant from the National Cancer Institute "Administrative supplements for NCI-designated cancer centers to support collaboration within existing state and local coalitions and HPV immunization programs with a focus on HPV vaccination in pediatric care settings," (NIH/NCI P30CA044579), issued July 17, 2014. Primary Investigators for the NCI grant are Drs. Jessica Keim-Malpass and Emma Mitchell. The grant objectives are to do an environmental scan (a) to better understand the facilitators to HPV vaccination uptake in the UVA Cancer Center catchment area and (b) to form collaborations with state and local cancer coalitions and immunization programs in order to identify local research priorities and challenges to increase HPV vaccination uptake. The environmental scan engages with (a) parent/caregiver and adolescent dyad, (b) health care providers (HCPs), (c) infrastructure within UVA and community partners, and (d) public policy. This study focuses on the environmental scan of HCPs and community partners. Dr. Jessica Keim-Malpass has approved this study (Figure 6).

Procedures

After IRB approval, a primary investigator sent an email message to all stakeholders requesting that they email or schedule the interview with the doctoral student (Figure 4). The email message contains information regarding the study, confidentiality and protection of identity, risks, benefits, and voluntary nature of the interview. The doctoral student contacted individuals via a follow-up email or telephone call if no response in 2 weeks. If no response from the stakeholder after the phone call, the stakeholder was removed from the list and, if possible, individual with similar qualification was contacted for an interview.

The doctoral student conducted the interview via phone or during a site visit using the key informant questionnaires in Figure 5. After consent for recording, a digital voice recorder was used to record the interview so that an accurate transcription could be done for later review and analysis. The interviewer also took written notes to capture the key points of each interview. If the individual stakeholder did not agree to audio recording, the doctoral student sent the typed interview summary to the stakeholder for review to ensure the accuracy of the information. Changes were made based on the stakeholder's feedback, and the final version was used for coding.

Measures

Interview questions are semi-structured using open-ended questions focusing on barriers and facilitators of HPV vaccination (Figure 5). Doctoral student and second researcher used content analysis to code for themes/categories. To establish the reliability of the content analysis, a third researcher analyzed a random sample of the data. The content validity was established by comparing the themes/categories to the socio-ecological framework. To improve rigor in the content analysis, the doctoral student maintained field notes (Vaismoradi, Turunen,

& Bondas, 2013). The field notes were posted on a shared site for the research team members to review.

Protection of Human Subjects

Primary Investigators obtained verbal consent before listing individuals on stakeholder list. After IRB approval (Figure 7), a Primary Investigator sent an introductory e-mail message (Figure 4) to stakeholders to proceed to the next step of scheduling the telephone or in person interview. The initial e-mail contained information on confidentiality and protection of identity, risks, benefits, and voluntary nature of the interview. Consent was implied when the stakeholders called or emailed the doctoral student to schedule the interview. The doctoral student reviewed confidentiality and identity protection information and received verbal consent before recording the interview.

Data Analysis

This exploratory, descriptive study used content analysis as discussed in Vaismoradi, Turunen, and Bondas (2013) to summarize the findings from the interviews. The doctoral student transcribed the interviews and obtained a sense of the whole interview and initial impression. One experienced qualitative researcher/faculty at the School of Nursing (SON) read the transcripts to get a general sense and idea of the interviews. Afterward, the SON faculty and the doctoral student read the text a second time, coded into SEM categories and compared. Once a consensus was obtained, the doctoral student used directed coding to collect codes under the categories/themes. The student met with SON faculty regularly to discuss progress and sort through any discrepancies. To establish reliability of the coding, a third researcher validated the findings and the team reached a consensus on the results.

The de-identified audio, transcription, and coding files were kept in a secured, password

protected Collab site. Any handwritten notes were shredded after transfer into electronic format.

Section IV: Results

Several barriers and facilitators were identified at all levels of the SEM. A summary of the results is found in Figure 8. Themes and exemplars are described in Table 2 and Table 3.

Parent-Child Dyad Level

Stakeholders identified knowledge gap, fear, sexuality belief, and healthy adolescents as barriers to care at the parent-child level. Often parents did not perceived HPV vaccine as a routine part of adolescent care and did not schedule an appointment unless the child was sick or needed a sports physical. Once at the appointment, the parents frequently expressed concerns and fear regarding the vaccine safety, efficacy, side effects, and what they heard from social media. The adolescents also mentioned the fear of needles as a barrier to initiating and completing injections. The parent also articulated that they did not think their child needed the vaccine because of their religion, or because their child was not sexually active, or that the vaccine promoted promiscuity. A small group of parents was not interested in any vaccine or the government or doctors telling them what their child needed or did not need. Knowledge regarding the cost associated with the vaccine and the medical visit may also prohibit some parent or young adult from accessing care. Lack of knowledge regarding the need, how to, and when to return for subsequent injections also prevented many adolescents from receiving their second and third shots.

Interpersonal Level

Time constraint and inconsistent or lack of recommendation by HCPs are barriers at the Interpersonal level. Gynecologists and oncologists wholeheartedly recommended the vaccines and cannot understand why the vaccination rate is not higher. One stakeholder said that

pediatricians and family practice providers are not making the strong recommendation for the vaccine and organizations are not holding them accountable. Ob/GYN providers may not offer the vaccine because they typically don't see the recommended age group and when they do, it's often too late. If the recommendation were made for the catch-up population up to age 26, the patient would still need to go to or find an immunization clinic that accepts their insurance to get the injections. Another barrier is that HCPs reported that they have a difficult time getting kids to their appointment because the adolescents are usually healthy, and the parents don't seek wellness appointments for them. Many providers reported addressing vaccination only at wellness visits; however, a few providers were trying to address it at all visits to avoid "missed opportunities." Time constraint and the need to prioritize care, however, can limit how much is covered during an acute care visit. Family practice providers reported too many competing priorities, such as the requirement for depression screening, that even though they have the intention of recommending the vaccine, they lose track and forget to do it. Moreover, stakeholders reported having to have the "sex talk" versus cancer prevention talk with parents of adolescents regarding the vaccine, which can be difficult and take extra time. Even within the same practice, not all health care providers made the same recommendation, and some did not do it at all. Some stakeholders reported that there were providers who would not "push" the vaccine for fear of losing the patient from the practice. They also reported that there are providers who "don't believe" in the vaccine. Furthermore, inconsistent messaging from support staff in the practice can downplay a licensed provider's strong recommendation.

On the whole, stakeholders reported that providers are making the recommendation, and they have used educational programs from the community, the CDC, and their professional organizations to help them learn "how to" talk effectively with parents and adolescents about the

vaccine. Pediatricians, in general, do a better job than family practice providers with vaccinations because that is what they do and it is part of their normal processes. Providers who treat the HPV vaccine like other vaccines are more likely to help with vaccination consent. Providers who have support staff to help with education and reminders are also more effective with making the strong recommendation.

Organizational Level

Cost, lack of infrastructure/champion, and resistance to outside resources are barriers at the organizational level. The cost of having a program in place for vaccination to include the storage and administration of the vaccine may prove to be too much for some organizations that provide free or reduced health care services. Organizations that are not familiar with health insurance plans and assistance programs, such as Vaccine for Children, limit what they can offer to their patients. Stakeholders cited inconsistent practices between clinics and within clinics, lack of training, and not holding physicians/providers accountable for "substandard" care as additional barriers. Other major hindrances include having a medical record system that does not provide alerts, inability to pull vaccination reports for measuring progress, reaching out to patients who are due for vaccination, and helping with reminders. Finally, organizations that are resistance to resources from industry and the community are likely to have less or no insight regarding available resources and how to incorporate best practices to improve HPV vaccination efforts.

Organizations that do well with HPV vaccination have a streamlined, team approach with a robust information system. These clinics all have similar processes and strategies such as treating vaccination as routine with established standing orders or pre-orders; and follow-up appointments and/or reminder systems. From check-ins to checkouts, clear, consistent

messaging on vaccination is addressed at all visits. Having an information system that allows stakeholders to pull reports, track progress, and reach out to the patients with alerts and reminder-recalls are cited as key facilitators.

Community Level

Bad data, lack of a champion, and limited health care financing capacity/resources were found to be barriers at the community level. Stakeholders shared various community efforts to improve cancer care and prevention; however, no one is leading the charge to promote adolescent vaccination. Efforts to reach specific groups or regions are limited because there is no good data to show which areas are doing well and which areas are not doing as well. The Virginia Immunization Information System (VIIS), a web-based system, is one effort the state health department hopes to use to track all immunizations given within the state; however, since its use is voluntary the data are not as accurate. While the system can pull reports and has reminder-recalls feature, individual clinics and users are not taking advantage of this feature because it's another system that they have to learn and use. Furthermore, VIIS is not set-up for clinics within larger medical center to extract a report at their clinic specific level. Even within these organizations' electronic health record (HER), many stakeholders said that they have a hard time getting immunization reports.

In rural communities, many stakeholders cited lack of transportation, poverty, geographical isolation, and limited health resources as barriers. Many individuals are unemployed or underinsured and cannot afford health care. Health clinics are sparse, and transportation is limited thus getting to appointments can be problematic especially since HPV vaccination requires three visits. While cancer support outreach is available, there is limited outreach to promote HPV vaccination.

Stakeholders described a few facilitators at the community level: educational outreach, presence of a champion, and engaged community. Firstly, community programs, such as the Cancer Action Coalition of Virginia and the Women's Health Virginia, provided educational outreach and resources to providers/nurses and some patients regarding HPV vaccination. Individuals who are leading these program are champions; however, their reach is limited, and there is no data available to track improvement in HPV vaccination rate. Secondly, the VDH is working to improve resources to stakeholders at all levels by making VIIS more robust and hiring a new Adolescent Immunization Coordinator. The individual in this position will collaborate with the Cancer Coalitions and other partnerships to develop a state strategic plan to improve adolescent immunizations. Finally, stakeholders are proud of the community they serve and cited various strengths and resources that may be helpful. Some stakeholders, for example, talked about engaging with school nurses to help with the vaccine registry and education.

Policy Level

Barriers at the policy level include an ineffective mandate, a failed Medicaid expansion, and the current political climate. First, the current mandate has a generous opt-out policy so many parents and providers treat the HPV vaccines as different and optional. There is no documentation needed for parents who declined the vaccine for their child. A few stakeholders weren't even aware of the mandate. Furthermore, the current mandate only covers girls so many people are unaware of the benefits to boys. And because of the bad publicity from the mandate, many stakeholders still feel the backlash from it. Second, the failed Medicaid Expansion still leaves some individuals vulnerable to the cost of the vaccine. Last, the current political climate of a failed mandate, conservatism, and anti-government rhetoric may make it harder for any changes to occur legislatively.

Despite this, endorsement of HPV vaccination by many professional organizations and the Affordable Care Act (ACA) are viewed as facilitators. Since the ACA focuses on prevention, coverage for vaccines is expected to improve although uptake may be slow. The CDC's "You are the Key" campaign and toolkit provided incredibly strong messaging and tools for the providers to give the strong recommendation. Professional organizations, such as the American Academy of Pediatrics (AAP), for example, have also provided resources and strategies for members to improve HPV vaccination effort.

Section V: Discussion

This study is the first of its kind to explore the barriers and facilitators from stakeholders involved with HPV vaccination and cancer prevention in Virginia. This study endorses the CDC's findings (Stokley et al., 2014) that knowledge gap and sexuality concerns at the parent-child dyad level and lack of provider's recommendation at the interpersonal level are big barriers to HPV vaccination. Most providers in this study said that they are making the recommendations to vaccinate; however, they are constrained by time and have a hard time getting adolescents to the appointments. Any programs to help bridge the knowledge gap at the parent-child dyad and to help providers communicate the strong recommendation without taking a lot of their time can facilitate HPV vaccination efforts. More thorough research is needed to explore the adolescent/parents' perspective for this region, the reasons for provider's hesitancy, and what implementation and communication strategy is effective for improving vaccination uptake.

Fear is a barrier that stands out in this study and is a component of vaccine hesitancy. According to the Strategic Advisory Group of Experts (SAGE) on Immunization of the WHO (2014, p. 7), vaccine hesitancy is the "delay in acceptance or refusal of vaccines despite availability of the vaccination services." Fear can promote learning, but it can impede readiness

to learn. Depending on the types of fear and the level of fear, it can lead to inactions and/or trust issues. Fear of needles from the adolescent and fear of sexual promiscuity from the parent, for examples, are mentioned as a barrier for the initiation and completion of the HPV vaccine. On the other hand, fear of cancer facilitates vaccination, and many stakeholders recommend this approach. Stakeholders also noted that parents were afraid of the vaccine from what they are learning on social media, especially from anti-vaccine groups. Instilling fear and distrust of the vaccine is a strategy of anti-vaccine groups. In response to the top 69 cancer centers' joint statement supporting HPV vaccination, the American College of Pediatricians (2016), for example, posted on social media stating that pediatricians were against the vaccine. Parents who saw the posting may think that all pediatricians were against the vaccine.

More research is needed on social media influence, anti-vaccine movement, and vaccine hesitancy and how to counter these barriers where the primary goal is to establish trust (Leask, 2015). To this end, Henrikson et al. (2015) conducted a randomized, interventional study to train doctors and other health care providers to better address parents' concerns regarding vaccination. They found no improvement in vaccination uptake and that parents who were hesitant to vaccinate their children had very strong feelings or distrust of vaccines in general. This supports the notion that there are core values that brief information doesn't change and more research to overcome trust issues is needed. Nowak, Gellin, MacDonald, Butler, and the Strategic Advisory Group of Experts (SAGE) Working Group on Vaccine Hesitancy (2015), for example, suggests that use of commercial and social marketing practices and principles may foster vaccine acceptance. Furthermore, A systematic review by Jarrett, Wilson, O'Leary, Eckersberger, Larson, and SAGE Working Group on Vaccine Hesitancy (2015) recommends multicomponent and dialogue-based interventions because they are most effective. However, they stress the

importance of tailoring the strategies to the target population, i.e., their reasons for hesitancy and the specific community/cultural context.

While cost was cited as a prominent barrier in the literature at the parent-child dyad level and interpersonal level (Rambout et al., 2014; Ferrer et al., 2014), Virginian stakeholders identify cost as less of a barrier. This study explains that the source of the issue may be that what might appear to be a cost barrier may, in fact, be a knowledge gap on the part of the parents, health care providers, or administrators regarding the various insurance programs, the impact of the Affordable Care Act, and vaccine assistance programs. In rural communities, at the level of the parent-child dyad, stakeholders indicates it is the indirect costs associated with getting the vaccine that may make it prohibitive. For example, the young adult or parents of adolescents may not be able to afford to take the time off from work, or they may not have the transportation means to get to the appointment. Cost is cited as an issue at the organizational level because it takes manpower, systems, and processes to provide vaccination services especially if these processes never before existed. This is common in many OB/Gyn offices.

A breakdown of vaccination rates by race or income is not available for the Commonwealth, but stakeholders observe health disparities based on race and for those who live below poverty and in rural communities. African American communities are noted to be resistant to vaccines in general due to history of exploitation and that Hispanics are receptive to vaccination. Another stakeholder observes that low-income minorities, in general, have more difficulty getting health care because some providers don't take Medicaid. Surprisingly, some stakeholders mention that the people who can afford the vaccines, live in urban areas, and are educated are the ones who are more resistant to vaccination. Nationally, according to the latest NIS-Teen Study (Reagan-Steiner et al., 2015), HPV vaccination rate is overall higher in Hispanic

adolescents, non-Hispanic black adolescents, and adolescents living below the poverty line. Non-Hispanic black female adolescents still have a lower HPV completion compared to non-Hispanic white female adolescents.

An important emphasis of this study is that the interactions of the various barriers and facilitators impact other SEM levels. Stakeholders talk about the lack of leadership and information system support at the organizational and community level as important barriers to the vaccination process at the interpersonal/provider level. Moreover, many stakeholders see the HPV mandate as ineffective and one stakeholder states, "Virginia jumped the gun too quickly. We are still feeling the backlash because of it." Because of the failed mandate and the generous opt-out, the vaccine is treated differently than other vaccines and many parents see the vaccine as optional. Some of the stakeholders are not even aware of the mandate. Of the eight factors identified by Colgrove, Abiola, and Mello (2010) as barriers to HPV mandate, stakeholders agree that the newness of the vaccine, involvement of Merck in the policy process, the sexually transmitted nature of HPV, and immature legislative mandate of the vaccine contribute to parental distrust of the vaccine. Other factors identified by stakeholders include resistance to governmental coercion, the influence of anti-vaccination activism, and social and religious conservatism as great challenges to the political environment.

Because of the adverse publicity from the failed mandate, social media scares from anti-vaccine groups and lack of positive messaging campaign, parents demonstrate knowledge gaps, fear of the vaccines, concerns about initiating sexual activity, and distrust of health care providers who promote the vaccine. Stakeholders identify a need for a communication campaign at the larger organizational or community level to help counter the negative media and improve knowledge regarding the vaccines. Stakeholders also want timesaving strategies, such as team

approach and effective immunization system or EHR that will allow them to work more efficiently and to track progress with HPV initiatives. In short, multi-level approaches are needed to improve HPV vaccination efforts within the state.

In summary, the stakeholders identified unique barriers and echoed the latest CDC's recommendation for multifaceted approaches (Reagan-Steiner et al., 2015, p. 787) to improve HPV vaccination efforts. These efforts include (a) incorporating HPV vaccination in cancer control plans; (b) joint initiatives with cancer prevention and immunization stakeholders; (c) public communication campaigns; (d) immunization information system-based reminder/recall; (e) assessment and feedback activities (including clinician-to-clinician education sessions emphasizing providing strong recommendations at ages 11-12 years); practice-focused strategies to educate staff and provide input on how to improve routine HPV vaccination within the practice; and (f) using all opportunities to educate clinicians and parents about the importance of on-time HPV vaccination. Additionally, stakeholders from this study identified the need for policy change. Stakeholders shared some of the initiatives underway in their clinics, in their organizations, and within the communities; however, these efforts are not strategic and coordinated. The Virginia Department of Health recognizes this and has hired a new Adolescent Immunization Coordinator. With this new position, improvement in VIIS functionality, and support from key stakeholders, the Virginia Department of Health is poised to help lead the change.

Strengths and Limitations

This study gathers information that is unique to Central and Southern Virginia regarding the barriers and facilitators to HPV vaccination. It provides information that can inform future efforts to develop and expand applied research and programs to increase HPV vaccination

uptake. These results are specific to the geographic area surveyed, and while not necessarily generalizable may be helpful to other regions intending to reduce barriers to HPV vaccination.

While a concerted effort has been made to select a representative sample of stakeholders to provide information, the possibility exists that important stakeholders were omitted or failed to participate in these interviews. School nurses, for example, were not interviewed in this study.

Nursing Practice Implications

Nurses are identified as essential team members to improve HPV vaccination efforts within Virginia. Nurses who provide direct patient care help with education, coordination of care, and administration of the injections. Nurses in administrative roles as nurse managers can provide staff education regarding HPV vaccination strategies, promote organizational EHR/VIIS use to track progress, and encourage process improvement initiatives at their organization. Advanced practice nurses (APNs) in pediatrics, family practice, and Ob/GYN must promote HPV vaccination as cancer prevention as part of their primary care efforts. APNs with doctor of nursing practice degree (DNP) can affect change at a greater level with organizational, community, and policy impact. Successful nursing efforts require teamwork and using available resources from the CDC, professional organizations, the industry, and the community to create a strategic plan, to help with implementation, and to track and celebrate successes. As the most trusted profession (Gallup Poll, 2015), nurses need to own the translational piece of HPV vaccination and DNP-trained nurses can lead it (Table 4).

Products of the Capstone

Dissemination is an important component of a Capstone project; therefore, a few plans are in place to share the results. First, we invited the Adolescent Immunization Coordinator from the Virginia Department of Health, and she was able to attend the Capstone presentation. As part

of the Capstone Committee, the PIs for the grant were also present to hear the presentation. Second, a manuscript is being prepared for submission to the journal, *Vaccine,* (Author Guidelines are shown in Figure 9). Finally, the author will present a poster at the national conference, "Women's Health 2016: The 24th Annual Congress," April 2016, in Washington, DC.

Conclusion

This study provides insights into the barriers and facilitators from the stakeholders' perspectives through the lens of the socio-ecological model. Some of the chief barriers identified are knowledge gaps, fear, and sexuality concerns at the parent-child dyad level; time constraint and inconsistent recommendation at the interpersonal level, lack of leadership and informational support at the organizational and community level, and ineffective mandate at the policy level. Facilitators identified are realistic and receptive attitude at the parent-child dyad level, provider's strong recommendation and educational support at the interpersonal level, team approach and useful data at the organizational level, educational outreach and community resources at the community level, and support from federal and professional organizations at the policy level. Understanding these factors can help stakeholders plan and implement an effective HPV vaccination strategy in Virginia. Based on this study, the three most important things that the Commonwealth should consider are to jointly work with cancer prevention and immunization stakeholders to incorporate HPV vaccination in the state cancer plan and initiatives to include policy change, to provide a comprehensive communication campaign, and to support health care providers with a robust immunization information system and provide strategies to educate key clinical and administrative staff about the importance of timely HPV vaccination.

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Table 1. Studies Included in Final Review (n = 10)

First Author, Year	Design	Socio-ecological Level evaluated	Population	Outcomes
Bartlett et al. (2011)	Literature review, n=14 studies; 2006-2010	Interpersonal/ Intrapersonal	Adolescent females, ages 9 to 17	Barriers include parents'/guardians' knowledge, perceptions, and attitudes, along with the convenience in receiving the vaccine and receiving a doctor's recommendation.
Ferrer et al. (2014)	Systematic Review/Evidence Synthesis; n=41 studies from "high-income countries"; n=24 from USA; 2006-2012	All levels	Young women ages 9-18 yrs	HPV vaccine is strongly governed by decisions of policy makers, healthcare professionals, and parents. Decisions are shaped by financial considerations, social norms and values relating to sexual activity, and trust in vaccination programs and healthcare providers. Universal healthcare systems offering free HPV vaccine at point of delivery can overcome financial barriers. Provider's recommendation play important role. Parents may decide against vaccination because of cultural/religious perceptions about sexual activity
Garcini et al. (2012)	Systematic review of parental perspective, n=17; 2006-2012	Multi-levels	Parents of adolescents, mostly girls	Most studies are observational studies using convenience sampling and relied on parental self-report. This may contribute to information bias. Inconsistent results with racial/ethnic differences in vaccine uptake. The most prevalent constructs associated with vaccine uptake were demographics and access-related factors (88% of studies; e.g., provider's recommendation, insurance coverage), followed by parental attitudes and beliefs (76% of studies). Having received a provider's recommendations for the vaccine was the strongest predictors of vaccine initiation.
Gelman et al. (2013)	Regression analyses using National Survey of Family Growth data, 2008-2010	Multi-levels	N=2168 females, ages 15-24	Significant racial/ethic disparities in HPV initiation: US-born Hispanics, foreign-born Hispanics, and African Americans were less likely than whites (p<.001). Health care access further worsens disparity in US-born and foreign-born Hispanics. Access did not seem to play a role for African-Americans.

Table 1. Studies Included in Final Review (n = 10) (*Continued*)

Head et al., (2013)	Qualitative interview of 8 healthcare providers in a rural setting (Appalachian Kentucky)	Interpersonal, community,	Young women ages 18-26	Significant themes centered around vaccine uptake and vaccine adherence. Patient barrier to initiation: fear of needle, vaccine is not important to health (better provider recommendation can help). Inadequate region- and age-specific education and promotion of vaccine. Low adherence due to 3-dose schedule (missed opportunities, need for reminder system and education on process for f/u injections can help). Limited sample but provided insight.
Jeudin et al. (2014)	Literature review, extracted information regarding race (black, Latino, Asian) and incomes; No date or # of studies reported	Multi-levels	Low-income and minority girls	Low-income and minority adolescents are equally or more likely to start HPV vaccination series than are white and higher-income adolescents. They are less likely to complete all 3. Provider recommendation is a key factor and minorities are less likely to report receiving recommendations. Unique barriers to specific groups are discussed.
Kessels et al. (2012)	Systematic review, n=25 studies; n=20 from USA; 2006-2011	All levels	Ages 9-18	Higher vaccine uptake was associated with having health insurance, of older age, receipt of childhood vaccines, a higher vaccine-related knowledge, more healthcare utilization, having a healthcare provider as a source of information, and positive vaccine attitudes. African American girls were less likely to have either initiated or completed the 3 dose series.
Rahman et al. (2013)	Behavioral Risk Factor Surveillance System, 2008-2010	Multi-levels	N=2632 females, ages 18-26	Women living in the South were less likely to initiate or complete vaccine series compared to women living in the Northeast.

Table 1. Studies Included in Final Review (n = 10) (*Continued*)

Rambout et al. (2014)	Systematic review of self-report barriers/facilitators; n=22 North America (USA, Canada); 2008-2011	Multi-levels	Adolescent and young women ages 9-26	Participants identified 21 barriers. Cost was the most frequently reported barriers, followed by feelings that vaccination was unnecessary, and concerns regarding vaccine safety and side effects. Facilitators included perceived benefit of vaccination, health care provider recommendations, and social norms. Not being sexually active was the most commonly reported barrier among adolescents.
Stokley et al. (2014)	National Immunization Survey-Teen (NIS-Teen); Questionnaire for parents of teens	Intrapersonal	Adolescents aged 13-17 in 50 states, District of Columbia.	Top 5 reasons from parents of girls for non-vaccination were lack of knowledge, not needed or necessary, safety concern/side effects, not recommended, and not sexually active.

Table 2. Themes and Exemplars Regarding HPV Vaccination Barriers

PARENT-CHILD DYAD	**Knowledge gap** "I think the consumer education, the people who need to be educated, the parents who are resistant, or the young adult who are resistant.... sometimes their readiness to learn...if they don't want to know, they may not be open to the information."--*Community program* "Perhaps lack of education, lack of information. Being unclear about how to get the vaccine, where to get the vaccine."--*Professor* **Fear** "I hear a lot of people who are concerned about vaccinations in general."--*Community program* "For some people, it may be understanding and trusting that it's beneficial."--*MD* "Vaccine hurts. After they get the first one, they are a little timid on #2 and #3. That's probably the biggest comment we get from the recipients."--*Pharmacy* **Sex Stigma** "Well boys also, I mean. It's interesting, it seems....and we looked at our data not too long ago..it seems that parents are more concerned about giving it to girls than they are boys. (chuckle). Boys are expected to stray I guess, (more chuckle), but they don't seem to be that concerned."--*Health Dept* "And I think one of the other main hesitation points that we hear from parents is that they don't understand why their child need to be vaccinated against a disease that is sexually transmitted at such a young age when they believe or hope that their child won't be sexually active until later on."--*RN* **Healthy Population** "It focuses on adolescents who don't have to come in to the doctor's office as often maybe unless they are doing a school physicals or things like that."--*Health Dept* "Most of the children at this age don't go to the doctor regularly, they only go for sports or when they're sick. So the fact that if it's not part of the regular routine of booster, it's easily fall of the radar."--*Community program*
INTERPERSONAL	**No Recommendation** "Meaning that the physicians are not promoting the vaccine as good medicine to their patients. They have no problem promoting the other vaccines, but HPV vaccine stands alone, as you know being promoted. I think it's a failure of physician leadership. Failure of physicians to being willing to say this is an unequivocally terrific medicine."--*MD* "Immunization is not central to FM so they are not proactive and making strong recommendations toward all vaccines." --*Industry* "The biggest barriers in my view are physicians are not recommending and not following through on vaccinations. But the problem is that the folks who need to do the vaccination are the pediatricians. Or family medicine. Most people don't get their gyn exam until they are almost out of the window for vaccination." --*MD* "They have been counseled by previous physicians in their local, rural area that they lived in. The physician advised against it. That was the barrier."--*RN* **Time Constraint** "Providers are always difficult to reached because of their available time…. how do you reach people who are busy."--*Community program* "I think that so much falls on the nurses that they don't have the time to routinely go out their way to find these vaccine or what not."--*Health Dept* "A lot of the feedback that we got from physicians and nurses were that there wasn't always times to talk about it and if the patient/parent didn't bring it up, most of the time it didn't get addressed."--*Community program* "One of the biggest challenges is, really has nothing to do with the vaccine itself, it's just on top of everything else because we talk about vaccine every time - Making sure we address it, making sure one of us can do it notably our nurse who is being pulled in different directions. So our intentions are honorable. So the biggest challenge/barrier is making sure we include that in the visits as far as time."--*NP*

Table 2. Themes and Exemplars Regarding HPV Vaccination Barriers (*Continued*)

ORGANIZATIONAL	**Cost** "It's expensive, but if you have insurance it's covered. If you don't have insurance and you are Medicaid or un-insured and you go to the VFC then it's provided to you based on your inability to pay. So I don't think so, but I don't know. Maybe that's unknown. Maybe people don't know what access they have if they have limited resources."—*Pharmacy* "One thing that I've noticed, a lot of the Ob offices are not carrying the HPV vaccine…"--*Health Dept* "Cost is a barrier, but I don't know how much of a barrier other than access. Is it cover by Medicaid or any of the children's program? –*Community program* **Lack infrastructure/Champion** So the alternative is to have the insurers and/or organizations make it a performance criteria. –*MD* "Currently lack infrastructure to schedule that far out for a nursing visit, lack of infrastructure to determine how is behind in immunizations, VIIS not efficient). Currently: letting them schedule them own, low number that do."--*MD* Organizations don't place immunization as high enough of priority; more focus on chronic illnesses."--*Industry* **Resisting Help** "Access to organization --people won't let you in the door because (1) perception with industry that collaborating is negative (2) time constraint – providers are overwhelm with managing changes to healthcare; perception of disruption to busy schedule (3) hard to get one-on-one time with providers/doctors- perception of distrust, that there is a catch. Providers do not realize that drug industry have changed too, more collaboration rather than selling."--*Industry* "And then I guess a challenge off of that is also the lack of time that I noticed with providers saying, "Well, we don't have time to go to another system to look up record."--*Health Dept*
COMMUNITY	**Bad Data** "One is my concern that we don't have very good data on just how well or how badly we're doing. A lot of it is guesstimates based on national data and or limited sources such as VIIS and the Vaccine For Kids program."--*Community program.* "Because VIIS is a voluntary system in Virginia, our rates still tend to be showing lower maybe than what the national average or what Virginia's average are."--*Health Dept* **Limited Health Care Financing/Resources** "Funding is definitely a challenge that changes from year to year… We also have a lot of trouble with transportation in this area. It's very mountainous area so it's difficult for people to get to where they need to get to."--*Health Dept* "Well, we know that ethnic minorities tend to have more difficulty to access health care to begin with. [A]nd that (vaccine assistance programs) might actually promote access, but general speaking we know that low-income minorities tend to have more difficult barriers to health care both because some providers don't take Medicaid."--*Professor* **No Champion** "I would like to see the same amount of attention. I know it's a little harder because the scope of it is a little bit different, but I think any attention it has gotten that way has been negative unfortunately. So basically having someone willing to fight back against that will be really nice."--*RN* "I think you got to first, we live in an area with a strong, fundamental religious approach. And somehow, I think as well as nationwide this discussion of HPV has been about sex, where it should be about cancer. I think we get too many moral voices on this….I think the medical community needs to really step forward instead…."--*Community program*

Table 2. Themes and Exemplars Regarding HPV Vaccination Barriers (*Continued*)

POLICY	**Ineffective mandate** "Other barrier is that it's not a school requirement vaccine in Virginia. So parents thinking, 'Well if I don't have to have it, then I don't need to get it.' And medical providers thinking also, 'Well if it's not required by schools...' and so it's being treated more as a optional vaccine…"--*Health Dept* "There's not accountability for that requirement so that bring the message to parent and they seem to interpret it as that maybe this vaccine is not as important as some of the other school-required vaccines."--*RN* "Currently the mandate is only for girls, not for boys. And while parents can opt out of the mandate, there's no way to determine it in the data versus, in the tracking, if a parent opt out because they chose not to or were they not even asked about immunization for their child."--*Health Dept* **Failed Medicaid Expansion** "Since the state of Virginia chose not to expand Medicaid under the Affordable Care Act, we have a lot of people kinda trapped. They're making a little too much for Medicaid but they don't make enough to be able to go into the health exchange of the Affordable Care Act"--*Community program* "The big challenge is there are people who don't have any healthcare at all or the people that fall through the crack because **they don't have Medicaid Expansion**. Vaccinations are expensive."--*MD* **Political/Legislative Climate** "I do think that the resistance to the mandate has been a problem and there has been numerous efforts over the years to get that off the book. So any attempt to do better legislatively risk losing what we got. I think that some of the conservative elements, and I don't mean political conservative, but just very conservative religious conservative. What family should do, and not what society should do ...that those are barriers we're going to have to deal with in large part of the commonwealth and in this catchment area."--*Community program*

Note: RN = Registered Nurse; NP = Nurse Practitioner; MD = Medical Doctor; VIIS = Virginia Immunization Information System

Table 3. Themes and Exemplars Regarding HPV Vaccination Facilitators

PARENT-CHILD DYAD	**Realistic and receptive attitude** "I think our clinic, our families are receptive to it. They have realistic perceptions about adolescent sexual activity and want their kids protected. For the most part, our patient population at our teaching clinic are very open to vaccine."--*MD* "For most people we tell them that they are due for vaccines and we have the VIIS information sheet. And they say, 'Okay'"--*NP*
INTERPERSONAL	**Strong Recommendation** "And that the provider will recommend it because, as oppose to our recommending it. The provider's is one of the best predictor of whether patients would get the vaccine."--*Community program* **Provider Education programs** "So finding ways that will help families understand that this vaccine prevent cancer and you have to receive it before you become sexually active in order for it to provide the best protection. Somehow getting that message across in a positive way…."--*RN* "And so, physicians have to deal with these crazy schedules and the timing of these things. And so we just have to make it clear to them and provide them with the tools to deal with the patients that are coming to them."--*Health Dept* "I think our outreach educations to providers in lecture format has been well received. People have said that they'll change how they're presenting the vaccine to their patients and families."--*MD*
ORGANIZATIONAL	**Team Approach** "Takes a multi-factorial, standardized approaches (patient education, provider education, reminder system, use of EMR). Use ideas from CDC."--*Industry* "I know that for a fact when it first came out, we sat down with the criteria and the education available and went over it with the nurses. I myself met with the physicians prior to that meeting just to make sure they were on board with exactly we wanted to do as far as the age range."--*RN* "No matter what they come for, we have their record and then we update it. And trying to get them scheduled before they leave."--*RN* **Robust Information System /EHR** "What works well: (1) Electronic health record (EHR) set-up for reminder—this is a best practice; (2) put in hands of clinical staff through standing orders and standard practice; good system for call back; follow-up appointments for 2nd and 3rd shots before leaving."--*Industry* **Open to Outside Help** "Because some of the states are further ahead than we are and their rates are better. There have been some really good webinars like the CDC webinar from Florida and Georgia where the rates were worse than Virginia, but these small practices have really revved how they educated their patients, how they challenged their doctors and I think we can all learn from their successes."--*Community program*

Table 3. Themes and Exemplars Regarding HPV Vaccination Facilitators (*Continued*)

COMMUNITY	**Educational Outreach** "…CDC recommends that we try to educate the providers to push it as of the regular vaccines, just like any other school requirement….I think as more vaccine education is being done on HPV, which there is a lot of resources out there, but just getting it to the people that really need it." –*Health Dept* " "[The Cancer Coalition of Virginia] did a number of initiatives related to HPV for the last 5 years and have generated a lot of interest in making certain that HPV stays top of minds in public health."--C*ommunity program* "There definitely need to be consistent messaging across all sectors and then coordinated effort. We can't have one group saying one thing and another group recommending something else. Consistent and coordinated."--*Health Dept* **Engaged Community** "I think we have a really good health department. I think that anything they issue is very positive so we feel supported. I feel supported by them. There seems to be consistency in the message as compare to the family practice."--*NP* "I think that it's an engaged population more than other areas. I think the strengths is that we have the University and a lot of really great public health programs and resources for people to tap into."--*Community program* "We (Women's Health Virginia]) are also actively involved with the Cancer Action Coalition of Virginia and the cancer plan has a goal of increasing uptake of HPV vaccines."--*Community program* **Presence of Champion** "That's one of the reasons we brought an Adolescent Coordinator on."--*Health Dept*
POLICY	**Endorsed by Professional Organizations** "It's been promoted by the CDC. In the last year, CDC has had incredibly strong messaging. Every organizations that's out there promote/say, 'HPV vaccine...recommended for boys and girls, boys and girls." There's no medical organizations…there's no organization in organized medicine that doesn't recommend HPV vaccine." --*MD* **Affordable Care Act (ACA)** "Immunization is important prevention. Affordable Care Act focuses on prevention so can improve vaccination rate, but it will be slow going."--*Industry* *"*Clearly the ACA requires health insurance plans to offer screenings and vaccines and preventative services that are recommended by the US Preventive Services Task Force. And to the extent that any vaccine is recommended, then the ACA would provide coverage for that vaccine which could expand access to it."--*Professor*

Note: RN = Registered Nurse; NP = Nurse Practitioner; MD = Medical Doctor; VIIS = Virginia Immunization Information System

Table 4. Translating Recommendations into Nursing Practice

PARENT-CHILD DYAD	• All nurses need to be aware of the barriers and facilitators at this level and identify strategies that counter the knowledge gap, fear, sexuality concerns. • Use every opportunity to educate parents about the importance of on-time HPV vaccination for cancer prevention.
INTERPERSONAL	• Registered nurses (RNs) are involved in administration of vaccine, HPV vaccine education, and coordination of care. • Advanced practice nurses (APNs) in pediatrics, family practice, and Ob/Gyn must promote, prescribe and administer HPV vaccination as evidence-based cancer prevention. • All nurses need to know and take advantage of available resources and training. • As the most trusted professional, nurses must educate parents and support the providers' strong recommendation for HPV vaccination at every encounter.
ORGANIZATIONAL	• RNs can contribute practice-focused strategies to educate staff and provide input on how to improve HPV vaccination within the practice, such as phone scripts, EHR prompts. • Nurse Managers/leaders should provide staff education regarding HPV as a cancer prevention strategy, and encourage process improvement initiatives to insure beginning and completion of the HPV vaccination series through the provision of organization-wide EHR/VIIS training and providing monthly or quarterly reports on that demonstrate progress. Develop an automated system or calendar "ticklers" to facilitate appointment reminder phone calls, and follow-ups on "no shows". • Nursing leadership in large health-care organizations must promote collaboration, teamwork and similar processes across the various clinics involved in HPV vaccination.
COMMUNITY	• Experienced community health nurses should provide input or work on a public communication campaign promoting HPV vaccination as cancer prevention. • Nurses need to be involved in the state cancer prevention plan to incorporate HPV vaccination strategies to reach key objectives. • Nurses, alongside other health-care professionals should lobby for collaboration between local health departments and local school boards to develop systems for in-school vaccination programs that can be tracked through EHR/VIIS.
POLICY	• Nurses must be involved in health policy at the local, state and national level. This includes phone calls, letters and meeting with local legislators and other elected and non-elected officials to explain what is not working and how Nurses can help fix it. This also includes supporting politicians who are sympathetic to the public health agenda with money and manpower. • Nurses experienced in health policy can work with other stakeholders to incorporate HPV vaccination in the state cancer plan and to affect legislative changes to the HPV vaccination mandate.

Note: EHR = Electronic Health Record; Virginia Immunization Information System = VIIS

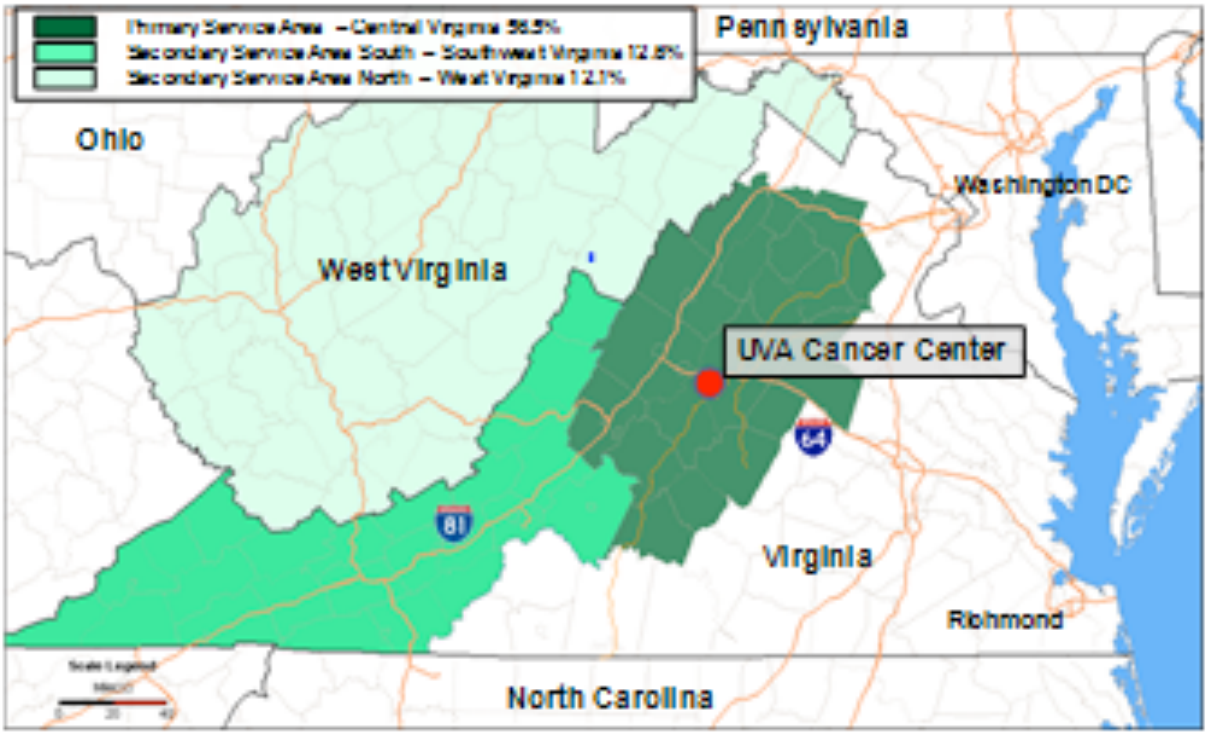


Figure 1. UVA Cancer Center's Primary and Secondary Service Areas. Used with permission from UVA's Cancer Control and Population Health (CCPH)

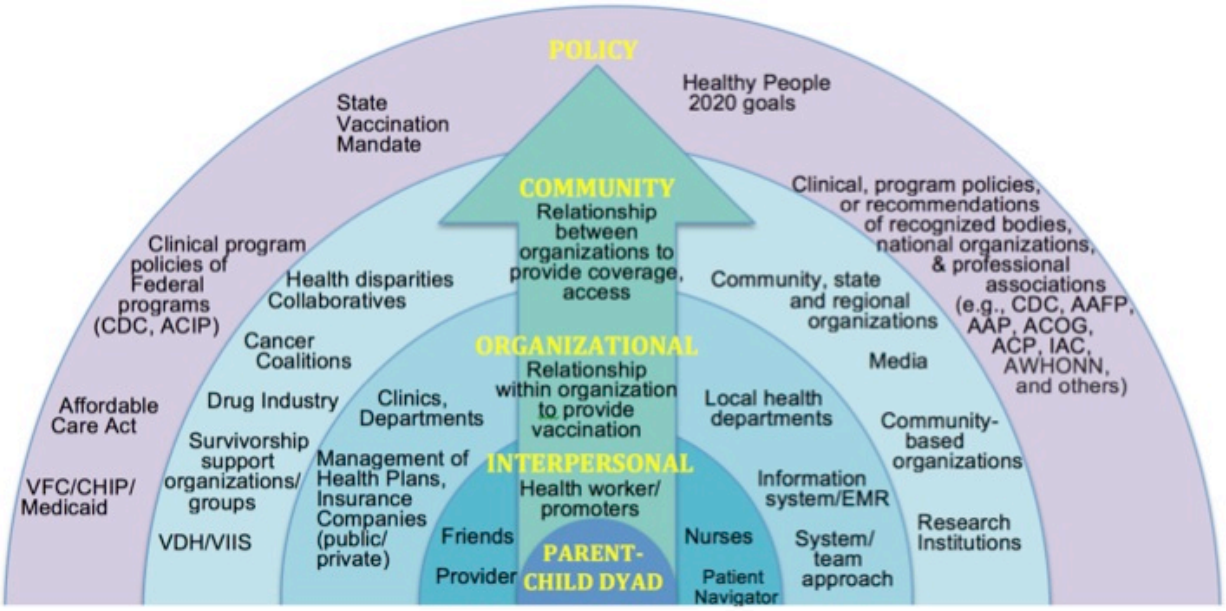


Figure 2. Socio-ecological Model (SEM) for HPV Vaccination.

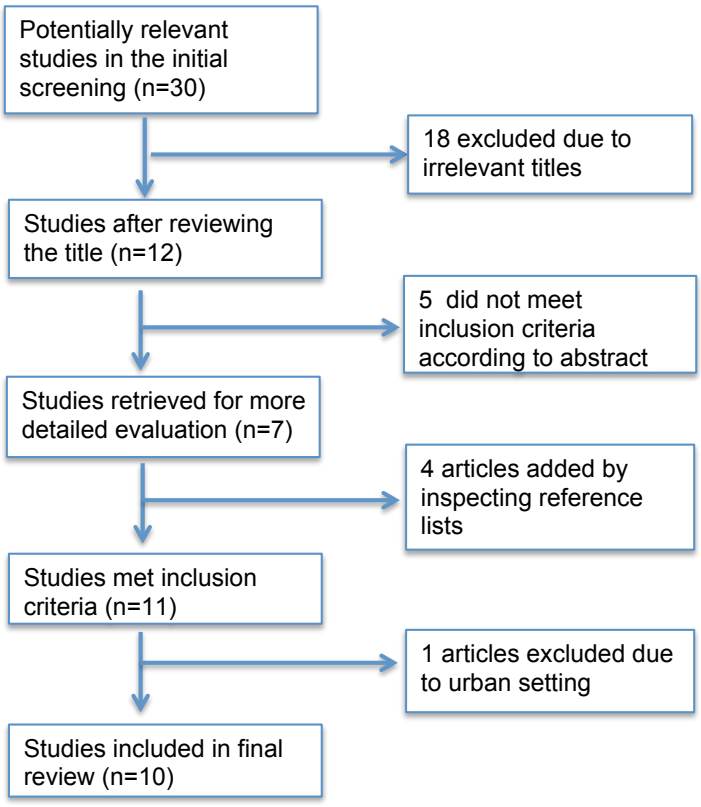


Figure 3. Method of Literature Review

UVA Cancer Center is currently conducting a Community Needs Assessment for the central and southwestern Virginia. The needs assessment looks at identifying barriers and facilitators to improve HPV vaccination initiation and uptake in young men and women ages 9 to 26. It also will identify important resources or processes that may still need to be developed to help support HPV vaccination within the community.

We have identified you as important stakeholder in the community and you have expressed interest in helping us with this project. We would like to proceed on to the interviewing stage.

You will be interviewed via phone or in person and the session will be recorded for future transcription, review, and evaluation for themes. Your contribution is vital to our effort to gather information about barriers to the HPV vaccine within the community. The information we gather will be will be published in the academic setting publicly available although direct identities and specific roles of stakeholders will be confidential, and will be used to direct efforts to address the HPV vaccination needs of this community. You can skip any question that makes you uncomfortable and you can stop the interview/survey at any time.

Please contact Miev "Mia" Carhart by email (mvh2e@virginia.edu) or by phone 804-836-7858 to schedule an intereview. If we do not hear from you, we will contact you with a follow-up email and/or telephone call.

Thank you for your time and for your dedication to providing the best service to your patients each and every day.

Sincerely,

UVA Cancer Center

Figure 4. Introductory Email to Stakeholders

Key Informant Interviews-

INTRODUCTION

Hello. My name is Miev Carhart, and I am a doctoral student at the University of Virginia School of Nursing. Thank you for participating in this interview being sponsored by the UVA Cancer Center. Your contribution is vital to our effort to gather information about barriers to the HPV vaccine within the community. The information we gather will be will be published in the academic setting publicly available although direct identities and specific roles of stakeholders will be confidential, and will be used to direct efforts to address the HPV vaccination needs of this community. Our interview will last about 20-30 minutes. Do you have any questions before we begin?

ORGANIZATIONAL STRUCTURE

1. Can you tell me a bit about what you do in your current role?
    a. What type of programs/services do you provide? What communities or neighborhoods do you work in? Who are the main patients/audiences for your program? (Probe: age, socioeconomic status, race/ethnicity)
    b. How long have you been doing this type of work?
        i. What are some of the biggest challenges you face in providing programs/services in the community?
    c. Do you currently partner with any other organization for any of your programs/services (Probe: how long have they partnered)
    d. How would you characterize what your interest in the HPV vaccine is (i.e., cancer prevention, public health, women's health, practice vs. research, etc)? Are you part of a practice where it's administered in your daily role?

INTERNAL SERVICES

2. I'm now going to ask about the strengths and weaknesses of each of the following services you provide that are specific to your organization:

    a. How is HPV vaccination education done? Can you think of any initiatives in this area that are working well? And poorly?
    b. If you are actively administering the HPV vaccine in your current role, what are facilitators that allow adolescents and young adults to initiate and complete vaccination? And barriers? (Probe to see if facilitators and barriers are different for initiation vs completion; adolescents vs young adults; males vs females)
    c. What differences have you noticed between initiation versus completion rate? How about adolescent vs young adults? And males versus females?
3. Can you describe to me your process for HPV vaccination in your facility? How do you handle follow-up appointments/vaccination?
4. If you had a wish list of what you could do to help correct the lagging rate of HPV initiation and completion, what would that be?

COMMUNITY ISSUES

5. How would you describe the community in which the University of Virginia (OR YOUR ORGANIZATION IF FAR OUTSIDE OF CHARLOTTESVILLE) serves?
    a. What do you consider the community's strengths?
    b. What challenges do residents face in the day to day?
    c. What do you believe are the residents' biggest barriers to overcoming issues related to the HPV vaccine initiation and completion?
    d. What HPV vaccination effort is working well?

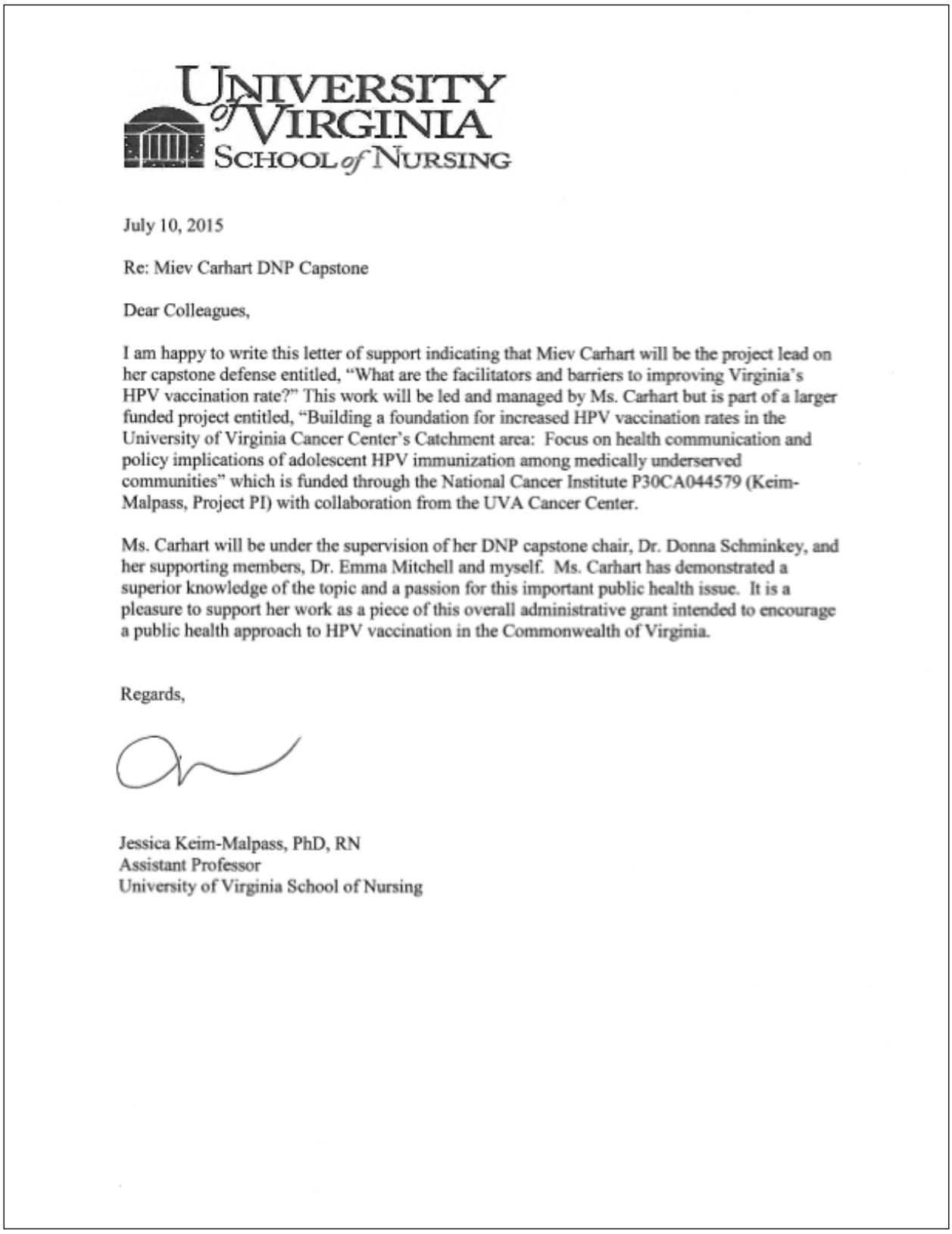
PERCEPTIONS OF UVA's catchment area

6. What is your perception of programs at UVA's catchment area?
    a. What is your perception of the community outreach activities/programs related to cancer prevention? How could HPV vaccination be incorporated into these services?

CLOSING

Thank you for your time. Is there anything else you would like to mention that we might have not discussed already today? Thank you again and have a great day.

Figure 5. Key Informant Interview Questions



UNIVERSITY of VIRGINIA
SCHOOL of NURSING

July 10, 2015

Re: Miev Carhart DNP Capstone

Dear Colleagues,

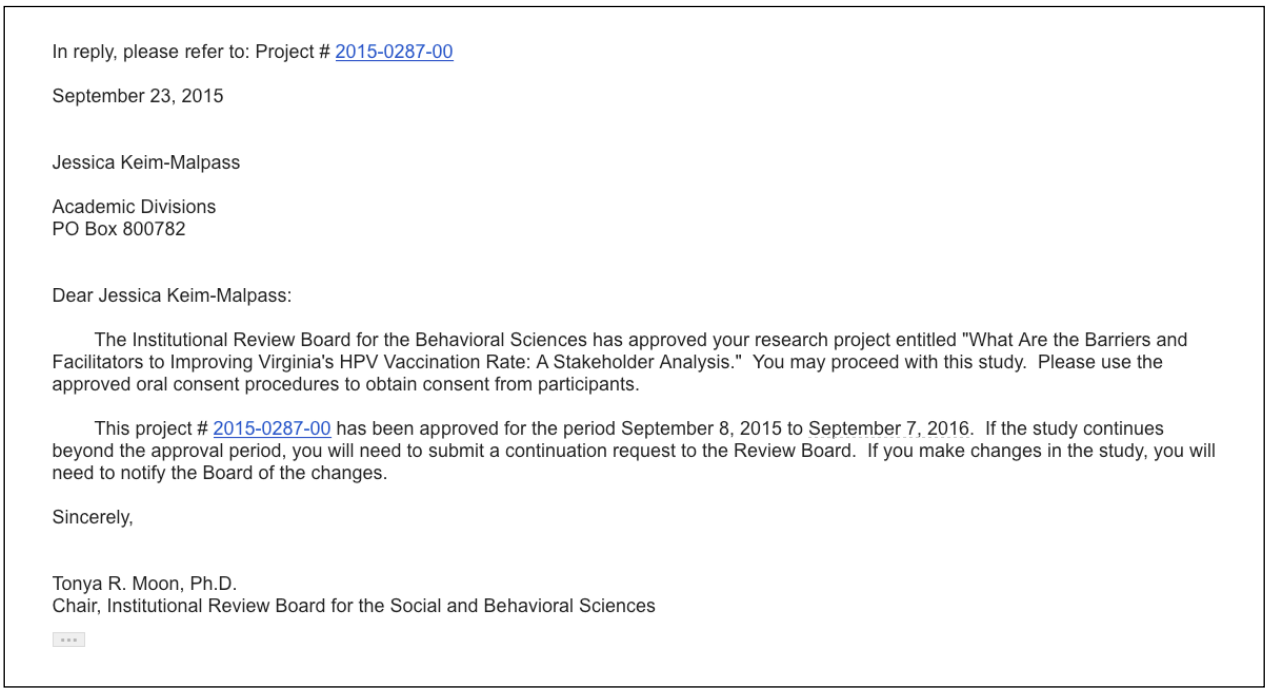
I am happy to write this letter of support indicating that Miev Carhart will be the project lead on her capstone defense entitled, "What are the facilitators and barriers to improving Virginia's HPV vaccination rate?" This work will be led and managed by Ms. Carhart but is part of a larger funded project entitled, "Building a foundation for increased HPV vaccination rates in the University of Virginia Cancer Center's Catchment area: Focus on health communication and policy implications of adolescent HPV immunization among medically underserved communities" which is funded through the National Cancer Institute P30CA044579 (Keim-Malpass, Project PI) with collaboration from the UVA Cancer Center.

Ms. Carhart will be under the supervision of her DNP capstone chair, Dr. Donna Schminkey, and her supporting members, Dr. Emma Mitchell and myself. Ms. Carhart has demonstrated a superior knowledge of the topic and a passion for this important public health issue. It is a pleasure to support her work as a piece of this overall administrative grant intended to encourage a public health approach to HPV vaccination in the Commonwealth of Virginia.

Regards,

Jessica Keim-Malpass, PhD, RN
Assistant Professor
University of Virginia School of Nursing

Figure 6. Letter of Support



In reply, please refer to: Project # 2015-0287-00

September 23, 2015

Jessica Keim-Malpass

Academic Divisions
PO Box 800782

Dear Jessica Keim-Malpass:

The Institutional Review Board for the Behavioral Sciences has approved your research project entitled "What Are the Barriers and Facilitators to Improving Virginia's HPV Vaccination Rate: A Stakeholder Analysis." You may proceed with this study. Please use the approved oral consent procedures to obtain consent from participants.

This project # 2015-0287-00 has been approved for the period September 8, 2015 to September 7, 2016. If the study continues beyond the approval period, you will need to submit a continuation request to the Review Board. If you make changes in the study, you will need to notify the Board of the changes.

Sincerely,

Tonya R. Moon, Ph.D.
Chair, Institutional Review Board for the Social and Behavioral Sciences

Figure 7. IRB Approval Documentation

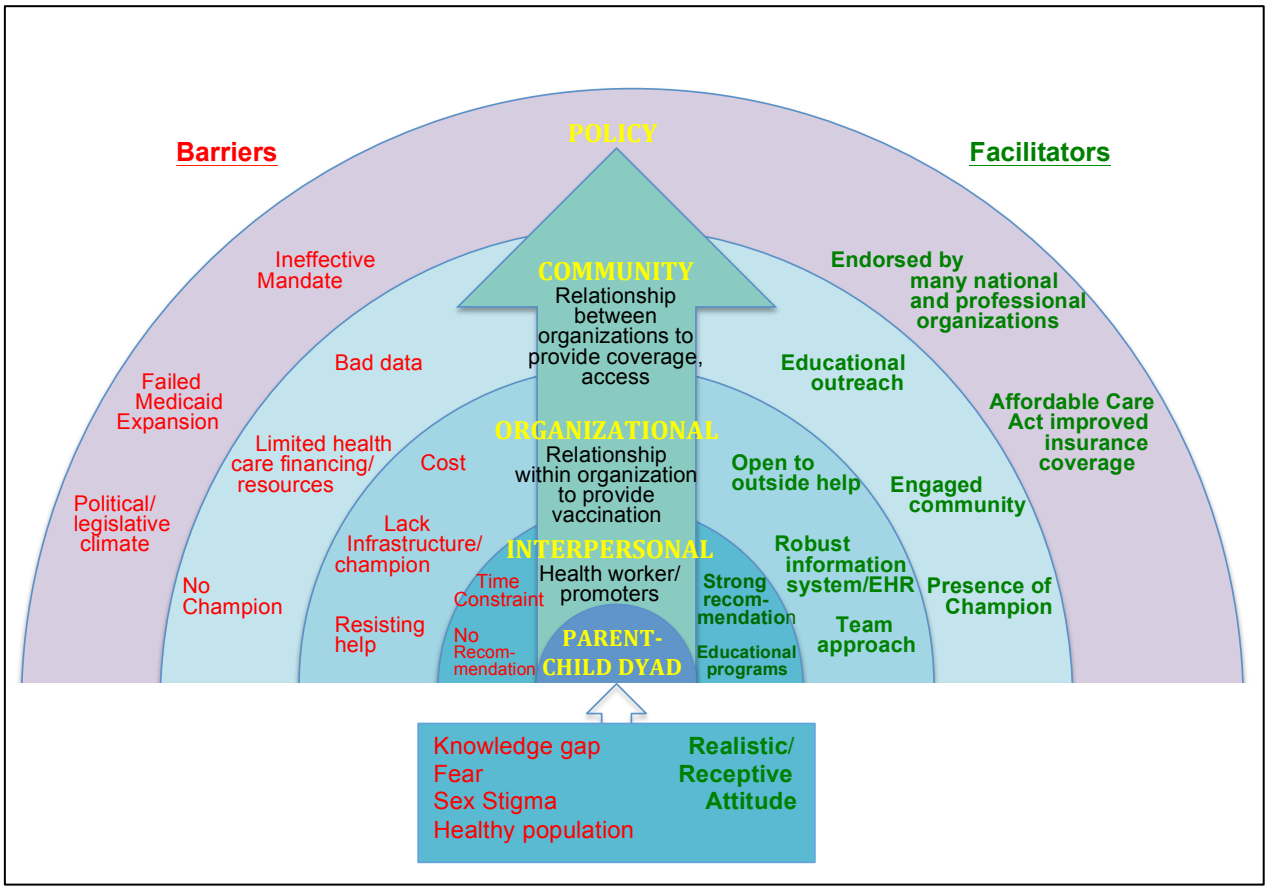
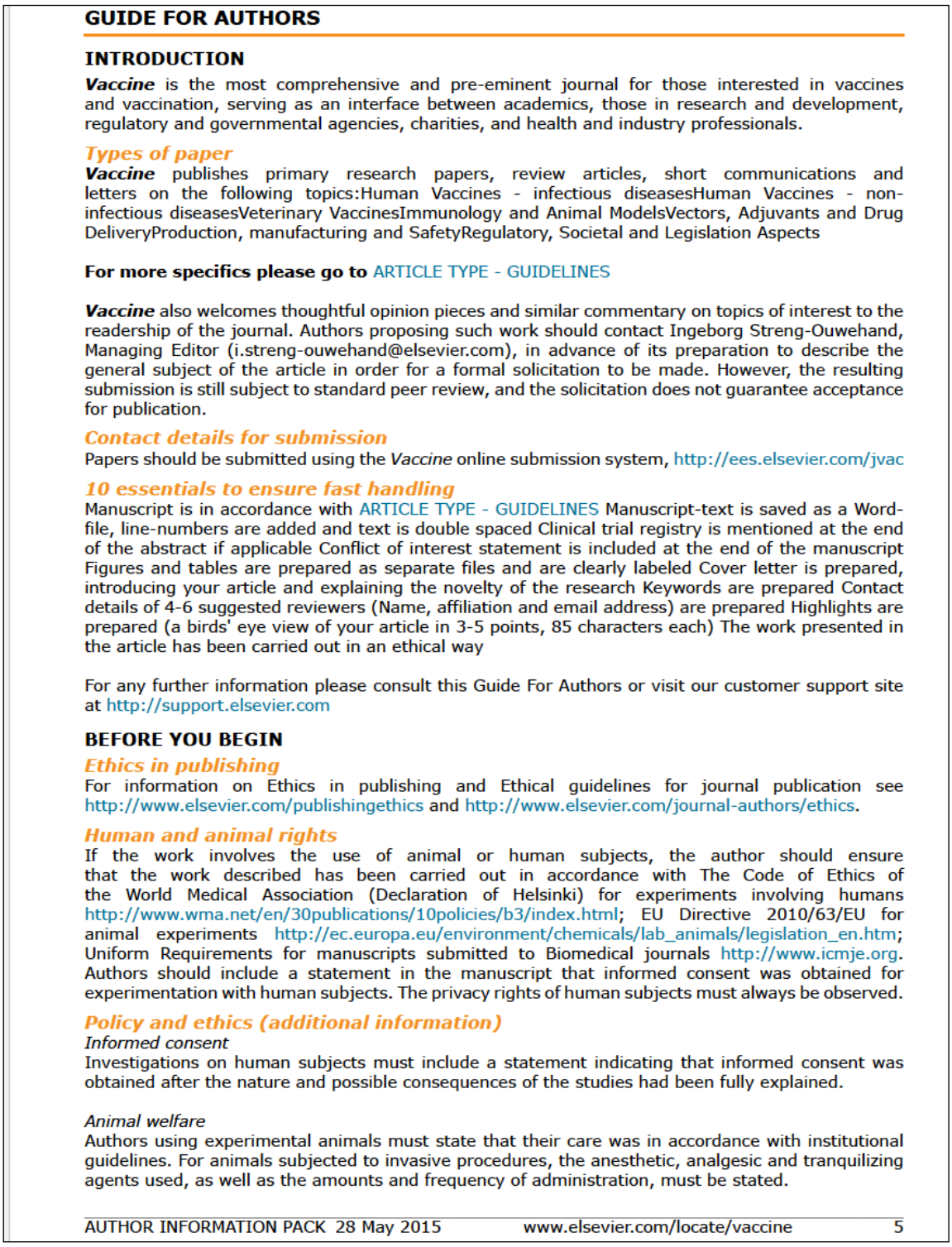


Figure 8. Barriers and facilitators identified by Stakeholders.



GUIDE FOR AUTHORS

INTRODUCTION

Vaccine is the most comprehensive and pre-eminent journal for those interested in vaccines and vaccination, serving as an interface between academics, those in research and development, regulatory and governmental agencies, charities, and health and industry professionals.

Types of paper

Vaccine publishes primary research papers, review articles, short communications and letters on the following topics:Human Vaccines - infectious diseasesHuman Vaccines - non-infectious diseasesVeterinary VaccinesImmunology and Animal ModelsVectors, Adjuvants and Drug DeliveryProduction, manufacturing and SafetyRegulatory, Societal and Legislation Aspects

For more specifics please go to ARTICLE TYPE - GUIDELINES

Vaccine also welcomes thoughtful opinion pieces and similar commentary on topics of interest to the readership of the journal. Authors proposing such work should contact Ingeborg Streng-Ouwehand, Managing Editor (i.streng-ouwehand@elsevier.com), in advance of its preparation to describe the general subject of the article in order for a formal solicitation to be made. However, the resulting submission is still subject to standard peer review, and the solicitation does not guarantee acceptance for publication.

Contact details for submission

Papers should be submitted using the *Vaccine* online submission system, http://ees.elsevier.com/jvac

10 essentials to ensure fast handling

Manuscript is in accordance with ARTICLE TYPE - GUIDELINES Manuscript-text is saved as a Word-file, line-numbers are added and text is double spaced Clinical trial registry is mentioned at the end of the abstract if applicable Conflict of interest statement is included at the end of the manuscript Figures and tables are prepared as separate files and are clearly labeled Cover letter is prepared, introducing your article and explaining the novelty of the research Keywords are prepared Contact details of 4-6 suggested reviewers (Name, affiliation and email address) are prepared Highlights are prepared (a birds' eye view of your article in 3-5 points, 85 characters each) The work presented in the article has been carried out in an ethical way

For any further information please consult this Guide For Authors or visit our customer support site at http://support.elsevier.com

BEFORE YOU BEGIN

Ethics in publishing

For information on Ethics in publishing and Ethical guidelines for journal publication see http://www.elsevier.com/publishingethics and http://www.elsevier.com/journal-authors/ethics.

Human and animal rights

If the work involves the use of animal or human subjects, the author should ensure that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans http://www.wma.net/en/30publications/10policies/b3/index.html; EU Directive 2010/63/EU for animal experiments http://ec.europa.eu/environment/chemicals/lab_animals/legislation_en.htm; Uniform Requirements for manuscripts submitted to Biomedical journals http://www.icmje.org. Authors should include a statement in the manuscript that informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects must always be observed.

Policy and ethics (additional information)

Informed consent

Investigations on human subjects must include a statement indicating that informed consent was obtained after the nature and possible consequences of the studies had been fully explained.

Animal welfare

Authors using experimental animals must state that their care was in accordance with institutional guidelines. For animals subjected to invasive procedures, the anesthetic, analgesic and tranquilizing agents used, as well as the amounts and frequency of administration, must be stated.

Figure 9. Instructions for Authors from *Vaccine* Journal. Full details can be found at http://www.elsevier.com/wps/find/journaldescription.cws_home/30521?generatepdf=true

Draft Manuscript

Barriers and Facilitators to Improving Virginia's HPV Vaccination Rate--A Stakeholder Analysis

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Jessica Keim-Malpass, PhD, RN
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Abstract

Background: Despite the evidence, the availability since 2006, and strong recommendations from many professional organizations, the human papillomavirus (HPV) vaccines have had low completion rate nationally and even lower in Virginia. We explored key stakeholders' perspectives on factors influencing HPV vaccination in central and southern Virginia.

Method: We conducted a semi-structured key informant interviews with 31 stakeholders involved in HPV vaccination or cancer prevention. Interviews were recorded and the transcribed data were coded into themes using socio-ecological model (SEM) framework.

Results: Stakeholders identified barriers at all SEM levels: Knowledge gaps and sexuality concerns at the parent-child dyad level, time constraint and inconsistent recommendation at the interpersonal level, lack of leadership and informational support at the organizational and community level, and an ineffective mandate at the policy level. Facilitators identified were realistic/receptive attitude at the parent-child dyad level, provider's strong recommendation and educational support at the interpersonal level, team approach and useful data at the organizational level, educational outreach and community resources at the community level, and support from federal and professional organizations at the policy level.

Conclusion: The stakeholder analysis provided an environmental scan of the barriers and facilitators so that an effective HPV vaccination strategy can be planned and implemented in the Commonwealth of Virginia.

Keywords: HPV vaccines, barriers, facilitators, socio-ecological model, Virginia, stakeholders

Introduction

Every 20 minutes, an American is diagnosed with a human papillomavirus (HPV)-associated cancer, and most are acquired in people in their teens and 20s [1]. With more than 79 million individuals infected and 14 million new cases each year, HPV infection is the most common sexually transmitted infection in the United States [2]. While most cases resolve spontaneously, persistent infections with HPV types 6, 11, 16 and 18 are most concerning because these lead to 26,000 new cancer cases and 90% of anogenital warts [3]. Of the different types of cancer, HPV types 16 or 18 account for 66% of cervical cancers, 55% of vaginal cancers, 79% of anal cancers, and 62% of oropharyngeal cancers [3]. The annual burden of HPV-related treatment for women is 3 million cases at a cost of $7 billion [4].

To counter this statistic, three effective and safe vaccines are available and recommended by the Advisory Committee on Immunization Practices (ACIP) for all young women ages 9 to 26, and two vaccines are available to young men ages 9 to 21 [5,6,7]. Despite endorsement by many professional organizations [8,9] and from the top 69 cancer centers [10], the initiation and completion rate of HPV vaccination series nationally in 2014 is only at 60.0% and 39.7% for girls, 41.7% and 21.6% for boys respectively [11]. In Virginia, the rate is lower at 59.2% for initiation and 35.9% completion for girls, and 36.3% initiation and 22.5% completion for boys [11]. The completion rate nationally and in Virginia is far below The Healthy People 2020 goal of 80% for all three injections [12] and many young men and women are still at risks for developing this highly preventive cancer and infection.

Virginia is unique because, in 2008, it was the first state to mandate HPV vaccination for girls entering middle school [13]. However, this legislation has faced numerous threats of appeal, and many experts have criticized its opt-out policy as being too generous because

parents/caregivers can opt out for any reason, and the policy only excluded boys [14,15]. The one published study addressing parental response to the Virginia HPV vaccination mandate found that parents had less trust in the vaccine because of the mandate [14].

Another confounding factor may be related to the rural and medically underserved communities the cancer center serves. Many of the counties are designated as "rural" and "medically underserved" according to the Health Resources and Services Administration [16,17]. A study [18] in Kentucky found a 7-fold decrease in rural women versus urban women returning for a follow-up vaccine doses despite the vaccine being free of charge.

A few themes emerged from the literature review. The most common barriers were cost [19-22], individual/parental barriers [19-24], lack of health care providers' recommendations at the interpersonal level [19-25], and health disparities [20, 22, 25-27]. Strong facilitators of HPV vaccination included health care provider's recommendations [19-22,25], free HPV vaccines [19, 20, 22], and positive vaccine attitudes held by parents and young adults (19-22]. The interactions of the various levels of the socio-economical model showed that overall, women who live in the South [26], have low-income [25], and are of racial/ethnic minorities [22, 25, 27] were less likely to initiate and/or complete the vaccination series.

Population-based research to date has identified several key factors contributing to the lagging HPV vaccination rate. The socio-ecological model (SEM) posits that complex interactions at the intrapersonal, interpersonal, organizational, community, and public policy levels shape health behavior [28]. For the adolescent, health care decision is often tied to the parent and labeled as "Parent-child dyad" at the intrapersonal level. Public policy, community support programs, and institutional processes further impact HPV vaccination. To better understand barriers and facilitators to HPV vaccination, the interactions between these levels are

examined. The purpose of this study is to identify barriers and facilitators to HPV vaccination using the socio-ecological model as a conceptual framework for improving HPV vaccination initiation and uptake in young men and women ages 9 to 26 at an NCI-designated cancer center catchment area. The data from this study will provide an environmental scan so that future programs can be developed to improve the HPV vaccination rate in Virginia.

Material and Methods

This is a descriptive study. A purposive sampling technique was used to identify stakeholders involved with aspects of care related to HPV vaccination or cancer outreach. Individuals not involved in HPV vaccination or cancer outreach were excluded. Twenty-eight interviews with 31 stakeholders were conducted over the phone or in person. The interviews occurred individually or in a group setting. Stakeholders were identified as registered nurses or nurse practitioners (n=7), medical doctors (n=7; with specialty in pediatrics, family practice, gynecology, oncology, and pathology), pharmacy or industry (n=5), health department (n=5), community programs (n=6), and professors (n=4). Since stakeholders had multiple roles, the roles identified do not equal to 31. The stakeholders had an average of 12.5 years of experience, with a range of one month to 48 years of experience or in their current position. Stakeholders represented public and private institutions. Ten stakeholders provided direct patient care with regard to HPV administration and/or education.

After IRB approval, a primary investigator sent an email message to all stakeholders requesting that they email or schedule the interview. The email message contained information regarding the study, confidentiality and protection of identity, risks, benefits, and voluntary nature of the interview. We conducted the interview via phone or during a site visit using the key informant questionnaires in Figure 1. After consent for recording, a digital voice recorder

was used to record the interview so that an accurate transcription could be done for later review and analysis. The interviewer also took written notes to capture the key points of each interview. If the individual stakeholder did not agree to audio recording, we sent the typed interview summary to the stakeholder for review to ensure the accuracy of the information. Changes were made based on the stakeholder's feedback, and the final version was used for coding.

Two researchers used content analysis to direct coding for themes. To establish the reliability of the content analysis, a third researcher validated the findings. The content validity was established by comparing the themes to the socio-ecological framework.

Results

Several barriers and facilitators were identified at all levels of the SEM. A summary of the results is found in Figure 2. Themes and exemplars are described in Table 1 and Table 2.

Discussion

This study is the first of its kind to explore the barriers and facilitators from stakeholders involved with HPV vaccination and cancer prevention in Virginia. This study endorses the CDC's findings [29] that knowledge gap and sexuality concerns at the parent-child dyad level and lack of provider's recommendation at the interpersonal level are big barriers to HPV vaccination. Most providers in this study said that they are making the recommendations to vaccinate; however, they are constrained by time and have a hard time getting adolescents to the appointments. Any programs to help bridge the knowledge gap at the parent-child dyad and to help providers communicate the strong recommendation without taking a lot of their time can facilitate HPV vaccination efforts. More thorough research is needed to explore the adolescent/parents' perspective for this region, the reasons for provider's hesitancy, and what implementation and communication strategy is effective for improving vaccination uptake.

Fear is a barrier that stands out in this study and is a component of vaccine hesitancy. According to the Strategic Advisory Group of Experts (SAGE) on Immunization of the World Health Organization [30, p.7], vaccine hesitancy is the "delay in acceptance or refusal of vaccines despite availability of the vaccination services." Fear can promote learning, but it can impede readiness to learn. Depending on the types of fear and the level of fear, it can lead to inactions and/or trust issues. Fear of needles from the adolescent and fear of sexual promiscuity from the parent, for examples, are mentioned as a barrier for the initiation and completion of the HPV vaccine. On the other hand, fear of cancer facilitates vaccination, and many stakeholders recommend this approach. Stakeholders also noted that parents were afraid of the vaccine from what they are learning on social media, especially from anti-vaccine groups. Instilling fear and distrust of the vaccine is a strategy of anti-vaccine groups. In response to the top 69 cancer centers' joint statement supporting HPV vaccination in January 2016, the American College of Pediatricians [31], for example, posted on social media stating that pediatricians were against the vaccine. Parents who saw the posting may think that all pediatricians as represented in the American Academy of Pediatrics were against the vaccine.

More research is needed on social media influence, anti-vaccine movement, and vaccine hesitancy and how to counter these barriers where the primary goal is to establish trust [32]. To this end, Henrikson et al. [33] conducted a randomized, interventional study to train doctors and other health care providers to better address parents' concerns regarding vaccination. They found no improvement in vaccination uptake and that parents who were hesitant to vaccinate their children had very strong feelings or distrust of vaccines in general. This supports the notion that there are core values that brief information doesn't change and more research to overcome trust issues is needed. Nowak, Gellin, MacDonald, Butler, and the Strategic Advisory Group of

158 Experts (SAGE) Working Group on Vaccine Hesitancy [34], for example, suggests that use of
159 commercial and social marketing practices and principles may foster vaccine acceptance.
160 Furthermore, A systematic review by Jarrett, Wilson, O'Leary, Eckersberger, Larson, and SAGE
161 Working Group on Vaccine Hesitancy [35] recommends multicomponent and dialogue-based
162 interventions because they are most effective. However, they stress the importance of tailoring
163 the strategies to the target population, i.e., their reasons for hesitancy and the specific
164 community/cultural context.

165 While cost was cited as a prominent barrier in the literature at the parent-child dyad level
166 and interpersonal level [19,21], Virginian stakeholders identify cost as less of a barrier. This
167 study explains that the source of the issue may be that what might appear to be a cost barrier
168 may, in fact, be a knowledge gap on the part of the parents, health care providers, or
169 administrators regarding the various insurance programs, the impact of the Affordable Care Act,
170 and vaccine assistance programs. In rural communities, at the level of the parent-child dyad,
171 stakeholders indicates it is the indirect costs associated with getting the vaccine that may make it
172 prohibitive. For example, the young adult or parents of adolescents may not be able to afford to
173 take the time off from work, or they may not have the transportation means to get to the
174 appointment. Cost is cited as an issue at the organizational level because it takes manpower,
175 systems, and processes to provide vaccination services especially if these processes never before
176 existed. This is common in many OB/Gyn offices.

177 A breakdown of vaccination rates by race or income is not available for the
178 Commonwealth, but stakeholders observe health disparities based on race and for those who live
179 below poverty and in rural communities. African American communities are noted to be
180 resistant to vaccines in general due to history of exploitation and that Hispanics are receptive to

vaccination. Another stakeholder observes that low-income minorities, in general, have more difficulty getting health care because some providers don't take Medicaid. Surprisingly, some stakeholders mention that the people who can afford the vaccines, live in urban areas, and are educated are the ones who are more resistant to vaccination. Nationally, according to the latest NIS-Teen Study [11], HPV vaccination rate is overall higher in Hispanic adolescents, non-Hispanic black adolescents, and adolescents living below the poverty line. Non-Hispanic black female adolescents still have a lower HPV completion compared to non-Hispanic white female adolescents.

An important emphasis of this study is that the interactions of the various barriers and facilitators impact other SEM levels. Stakeholders talk about the lack of leadership and information system support at the organizational and community level as important barriers to the vaccination process at the interpersonal/provider level. Moreover, many stakeholders see the HPV mandate as ineffective and one stakeholder states, "Virginia jumped the gun too quickly. We are still feeling the backlash because of it." Because of the failed mandate and the generous opt-out, the vaccine is treated differently than other vaccines and many parents see the vaccine as optional. Some of the stakeholders are not even aware of the mandate. Of the eight factors identified by Colgrove, Abiola, and Mello [36] as barriers to HPV mandate, stakeholders agree that the newness of the vaccine, involvement of Merck in the policy process, the sexually transmitted nature of HPV, and immature legislative mandate of the vaccine contribute to parental distrust of the vaccine. Other factors identified by stakeholders include resistance to governmental coercion, the influence of anti-vaccination activism, and social and religious conservatism as great challenges to the political environment.

Because of the adverse publicity from the failed mandate, social media scares from anti-

vaccine groups and lack of positive messaging campaign, parents demonstrate knowledge gaps, fear of the vaccines, concerns about initiating sexual activity, and distrust of health care providers who promote the vaccine. Stakeholders identify a need for a communication campaign at the larger organizational or community level to help counter the negative media and improve knowledge regarding the vaccines. Stakeholders also want timesaving strategies, such as team approach and effective immunization system or electronic health record (EHR) that will allow them to work more efficiently and to track progress with HPV initiatives. In short, multi-level approaches are needed to improve HPV vaccination efforts within the state.

In summary, the stakeholders identified unique barriers and echoed the latest CDC's recommendation for multifaceted approaches [11, p. 787] to improve HPV vaccination efforts. These efforts include (a) incorporating HPV vaccination in cancer control plans; (b) joint initiatives with cancer prevention and immunization stakeholders; (c) public communication campaigns; (d) immunization information system-based reminder/recall; (e) assessment and feedback activities (including clinician-to-clinician education sessions emphasizing providing strong recommendations at ages 11-12 years); practice-focused strategies to educate staff and provide input on how to improve routine HPV vaccination within the practice; and (f) using all opportunities to educate clinicians and parents about the importance of on-time HPV vaccination. Additionally, stakeholders from this study identified the need for policy change. Stakeholders shared some of the initiatives underway in their clinics, in their organizations, and within the communities; however, these efforts are not strategic and coordinated. The Virginia Department of Health recognizes this and has hired a new Adolescent Immunization Coordinator. With this new position, improvement in VIIS functionality, and support from key stakeholders, the Virginia Department of Health is poised to help lead the

change.

Strengths and Limitations

This study gathers information that is unique to Central and Southern Virginia regarding the barriers and facilitators to HPV vaccination. It provides information that can inform future efforts to develop and expand applied research and programs to increase HPV vaccination uptake. These results are specific to the geographic area surveyed, and while not necessarily generalizable may be helpful to other regions intending to reduce barriers to HPV vaccination.

While a concerted effort has been made to select a representative sample of stakeholders to provide information, the possibility exists that important stakeholders were omitted or failed to participate in these interviews. School nurses, for example, were not interviewed in this study.

Conclusions

This study provides insights into the barriers and facilitators from the stakeholders' perspectives through the lens of the socio-ecological model. Some of the chief barriers identified are knowledge gaps, fear, and sexuality concerns at the parent-child dyad level; time constraint and inconsistent recommendation at the interpersonal level, lack of leadership and informational support at the organizational and community level, and ineffective mandate at the policy level. Facilitators identified are realistic and receptive attitude at the parent-child dyad level, provider's strong recommendation and educational support at the interpersonal level, team approach and useful data at the organizational level, educational outreach and community resources at the community level, and support from federal and professional organizations at the policy level. Understanding these factors can help stakeholders plan and implement an effective HPV vaccination strategy in Virginia. Based on this study, the three most important things that the Commonwealth should consider are to jointly work with cancer prevention and immunization

stakeholders to incorporate HPV vaccination in the state cancer plan and initiatives to include policy change, to provide a comprehensive communication campaign, and to support health care providers with a robust immunization information system and provide strategies to educate key clinical and administrative staff about the importance of timely HPV vaccination.

Conflict of Interest Statement

This study supports the grant from the National Cancer Institute "Administrative supplements for NCI-designated cancer centers to support collaboration within existing state and local coalitions and HPV immunization programs with a focus on HPV vaccination in pediatric care settings," (NIH/NCI P30CA044579), issued July 17, 2014. Primary Investigators for the NCI grant are Drs. Jessica Keim-Malpass and Emma Mitchell.

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Figures and Tables

Key Informant Interviews-

INTRODUCTION

Hello. My name is Miev Carhart, and I am a doctoral student at the University of Virginia School of Nursing. Thank you for participating in this interview being sponsored by the UVA Cancer Center. Your contribution is vital to our effort to gather information about barriers to the HPV vaccine within the community. The information we gather will be will be published in the academic setting publicly available although direct identities and specific roles of stakeholders will be confidential, and will be used to direct efforts to address the HPV vaccination needs of this community. Our interview will last about 20-30 minutes. Do you have any questions before we begin?

ORGANIZATIONAL STRUCTURE

1. Can you tell me a bit about what you do in your current role?
    a. What type of programs/services do you provide? What communities or neighborhoods do you work in? Who are the main patients/audiences for your program? (Probe: age, socioeconomic status, race/ethnicity)
    b. How long have you been doing this type of work?
        i. What are some of the biggest challenges you face in providing programs/services in the community?
    c. Do you currently partner with any other organization for any of your programs/services (Probe: how long have they partnered)
    d. How would you characterize what your interest in the HPV vaccine is (i.e., cancer prevention, public health, women's health, practice vs. research, etc)? Are you part of a practice where it's administered in your daily role?

INTERNAL SERVICES

2. I'm now going to ask about the strengths and weaknesses of each of the following services you provide that are specific to your organization:

    a. How is HPV vaccination education done? Can you think of any initiatives in this area that are working well? And poorly?
    b. If you are actively administering the HPV vaccine in your current role, what are facilitators that allow adolescents and young adults to initiate and complete vaccination? And barriers? (Probe to see if facilitators and barriers are different for initiation vs completion; adolescents vs young adults; males vs females)
    c. What differences have you noticed between initiiation versus completion rate? How about adolescent vs young adults? And males versus females?
3. Can you describe to me your process for HPV vaccination in your facility? How do you handle follow-up appointments/vaccination?
4. If you had a wish list of what you could do to help correct the lagging rate of HPV initiation and completion, what would that be?

COMMUNITY ISSUES

5. How would you describe the community in which the University of Virginia (OR YOUR ORGANIZATION IF FAR OUTSIDE OF CHARLOTTESVILLE) serves?
    a. What do you consider the community's strengths?
    b. What challenges do residents face in the day to day?
    c. What do you believe are the residents' biggest barriers to overcoming issues related to the HPV vaccine initiation and completion?
    d. What HPV vaccination effort is working well?

PERCEPTIONS OF UVA's catchment area

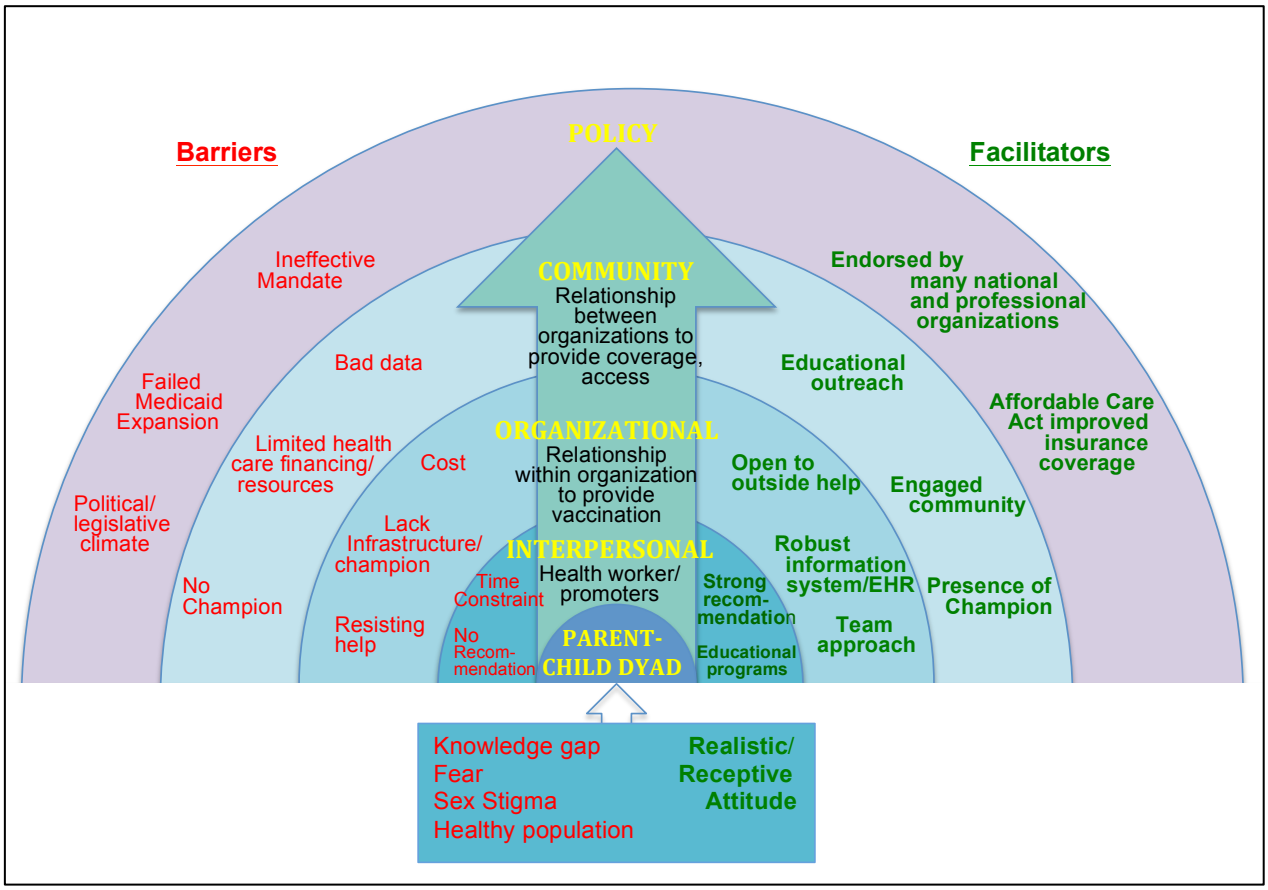
6. What is your perception of programs at UVA's catchment area?
    a. What is your perception of the community outreach activities/programs related to cancer prevention? How could HPV vaccination be incorporated into these services?

CLOSING

Thank you for your time. Is there anything else you would like to mention that we might have not discussed already today? Thank you again and have a great day.

399

400 Figure 1. Key Informant Interview Questions



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402 Figure 2. Barriers and facilitators identified by Stakeholders.

Table 1. Themes and Exemplars Regarding HPV Vaccination Barriers

PARENT-CHILD DYAD	**Knowledge gap** "I think the consumer education, the people who need to be educated, the parents who are resistant, or the young adult who are resistant.... sometimes their readiness to learn...if they don't want to know, they may not be open to the information."--*Community program* "Perhaps lack of education, lack of information. Being unclear about how to get the vaccine, where to get the vaccine."--*Professor* **Fear** "I hear a lot of people who are concerned about vaccinations in general."--*Community program* "For some people, it may be understanding and trusting that it's beneficial."--*MD* "Vaccine hurts. After they get the first one, they are a little timid on #2 and #3. That's probably the biggest comment we get from the recipients."--*Pharmacy* **Sex Stigma** "Well boys also, I mean. It's interesting, it seems....and we looked at our data not too long ago..it seems that parents are more concerned about giving it to girls than they are boys. (chuckle). Boys are expected to stray I guess, (more chuckle), but they don't seem to be that concerned."--*Health Dept* "And I think one of the other main hesitation points that we hear from parents is that they don't understand why their child need to be vaccinated against a disease that is sexually transmitted at such a young age when they believe or hope that their child won't be sexually active until later on."--*RN* **Healthy Population** "It focuses on adolescents who don't have to come in to the doctor's office as often maybe unless they are doing a school physicals or things like that."--*Health Dept* "Most of the children at this age don't go to the doctor regularly, they only go for sports or when they're sick. So the fact that if it's not part of the regular routine of booster, it's easily fall of the radar."--*Community program*
INTERPERSONAL	**No Recommendation** "Meaning that the physicians are not promoting the vaccine as good medicine to their patients. They have no problem promoting the other vaccines, but HPV vaccine stands alone, as you know being promoted. I think it's a failure of physician leadership. Failure of physicians to being willing to say this is an unequivocally terrific medicine."--*MD* "Immunization is not central to FM so they are not proactive and making strong recommendations toward all vaccines." --*Industry* "The biggest barriers in my view are physicians are not recommending and not following through on vaccinations. But the problem is that the folks who need to do the vaccination are the pediatricians. Or family medicine. Most people don't get their gyn exam until they are almost out of the window for vaccination." --*MD* "They have been counseled by previous physicians in their local, rural area that they lived in. The physician advised against it. That was the barrier."--*RN* **Time Constraint** "Providers are always difficult to reached because of their available time…. how do you reach people who are busy."--*Community program* "I think that so much falls on the nurses that they don't have the time to routinely go out their way to find these vaccine or what not."--*Health Dept* "A lot of the feedback that we got from physicians and nurses were that there wasn't always times to talk about it and if the patient/parent didn't bring it up, most of the time it didn't get addressed."--*Community program* "One of the biggest challenges is, really has nothing to do with the vaccine itself, it's just on top of everything else because we talk about vaccine every time - Making sure we address it, making sure one of us can do it notably our nurse who is being pulled in different directions. So our intentions are honorable. So the biggest challenge/barrier is making sure we include that in the visits as far as time."--*NP*

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404 Table 1. Themes and Exemplars Regarding HPV Vaccination Barriers (*Continued*)

ORGANIZATIONAL	**Cost** "It's expensive, but if you have insurance it's covered. If you don't have insurance and you are Medicaid or un-insured and you go to the VFC then it's provided to you based on your inability to pay. So I don't think so, but I don't know. Maybe that's unknown. Maybe people don't know what access they have if they have limited resources."—*Pharmacy* "One thing that I've noticed, a lot of the Ob offices are not carrying the HPV vaccine…"--*Health Dept* "Cost is a barrier, but I don't know how much of a barrier other than access. Is it cover by Medicaid or any of the children's program? –*Community program* **Lack infrastructure/Champion** So the alternative is to have the insurers and/or organizations make it a performance criteria. –*MD* "Currently lack infrastructure to schedule that far out for a nursing visit, lack of infrastructure to determine how is behind in immunizations, VIIS not efficient). Currently: letting them schedule them own, low number that do."--*MD* Organizations don't place immunization as high enough of priority; more focus on chronic illnesses."--*Industry* **Resisting Help** "Access to organization --people won't let you in the door because (1) perception with industry that collaborating is negative (2) time constraint – providers are overwhelm with managing changes to healthcare; perception of disruption to busy schedule (3) hard to get one-on-one time with providers/doctors- perception of distrust, that there is a catch. Providers do not realize that drug industry have changed too, more collaboration rather than selling."--*Industry* "And then I guess a challenge off of that is also the lack of time that I noticed with providers saying, "Well, we don't have time to go to another system to look up record."--*Health Dept*
COMMUNITY	**Bad Data** "One is my concern that we don't have very good data on just how well or how badly we're doing. A lot of it is guesstimates based on national data and or limited sources such as VIIS and the Vaccine For Kids program."--*Community program.* "Because VIIS is a voluntary system in Virginia, our rates still tend to be showing lower maybe than what the national average or what Virginia's average are."--*Health Dept* **Limited Health Care Financing/Resources** "Funding is definitely a challenge that changes from year to year… We also have a lot of trouble with transportation in this area. It's very mountainous area so it's difficult for people to get to where they need to get to."--*Health Dept* "Well, we know that ethnic minorities tend to have more difficulty to access health care to begin with. [A]nd that (vaccine assistance programs) might actually promote access, but general speaking we know that low-income minorities tend to have more difficult barriers to health care both because some providers don't take Medicaid."--*Professor* **No Champion** "I would like to see the same amount of attention. I know it's a little harder because the scope of it is a little bit different, but I think any attention it has gotten that way has been negative unfortunately. So basically having someone willing to fight back against that will be really nice."--*RN* "I think you got to first, we live in an area with a strong, fundamental religious approach. And somehow, I think as well as nationwide this discussion of HPV has been about sex, where it should be about cancer. I think we get too many moral voices on this….I think the medical community needs to really step forward instead…."--*Community program*

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406 Table 1. Themes and Exemplars Regarding HPV Vaccination Barriers (*Continued*)

POLICY	**Ineffective mandate** "Other barrier is that it's not a school requirement vaccine in Virginia. So parents thinking, 'Well if I don't have to have it, then I don't need to get it.' And medical providers thinking also, 'Well if it's not required by schools...' and so it's being treated more as a optional vaccine…"--*Health Dept* "There's not accountability for that requirement so that bring the message to parent and they seem to interpret it as that maybe this vaccine is not as important as some of the other school-required vaccines."--*RN* "Currently the mandate is only for girls, not for boys. And while parents can opt out of the mandate, there's no way to determine it in the data versus, in the tracking, if a parent opt out because they chose not to or were they not even asked about immunization for their child."--*Health Dept* **Failed Medicaid Expansion** "Since the state of Virginia chose not to expand Medicaid under the Affordable Care Act, we have a lot of people kinda trapped. They're making a little too much for Medicaid but they don't make enough to be able to go into the health exchange of the Affordable Care Act"--*Community program* "The big challenge is there are people who don't have any healthcare at all or the people that fall through the crack because **they don't have Medicaid Expansion**. Vaccinations are expensive."--*MD* **Political/Legislative Climate** "I do think that the resistance to the mandate has been a problem and there has been numerous efforts over the years to get that off the book. So any attempt to do better legislatively risk losing what we got. I think that some of the conservative elements, and I don't mean political conservative, but just very conservative religious conservative. What family should do, and not what society should do ...that those are barriers we're going to have to deal with in large part of the commonwealth and in this catchment area."--*Community program*

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Table 2. Themes and Exemplars Regarding HPV Vaccination Facilitators

PARENT-CHILD DYAD	**Realistic and receptive attitude** "I think our clinic, our families are receptive to it. They have realistic perceptions about adolescent sexual activity and want their kids protected. For the most part, our patient population at our teaching clinic are very open to vaccine."--*MD* "For most people we tell them that they are due for vaccines and we have the VIIS information sheet. And they say, 'Okay'"--*NP*
INTERPERSONAL	**Strong Recommendation** "And that the provider will recommend it because, as oppose to our recommending it. The provider's is one of the best predictor of whether patients would get the vaccine."--*Community program* **Provider Education programs** "So finding ways that will help families understand that this vaccine prevent cancer and you have to receive it before you become sexually active in order for it to provide the best protection. Somehow getting that message across in a positive way…."--*RN* "And so, physicians have to deal with these crazy schedules and the timing of these things. And so we just have to make it clear to them and provide them with the tools to deal with the patients that are coming to them."--*Health Dept* "I think our outreach educations to providers in lecture format has been well received. People have said that they'll change how they're presenting the vaccine to their patients and families."--*MD*
ORGANIZATIONAL	**Team Approach** "Takes a multi-factorial, standardized approaches (patient education, provider education, reminder system, use of EMR). Use ideas from CDC."--*Industry* "I know that for a fact when it first came out, we sat down with the criteria and the education available and went over it with the nurses. I myself met with the physicians prior to that meeting just to make sure they were on board with exactly we wanted to do as far as the age range."--*RN* "No matter what they come for, we have their record and then we update it. And trying to get them scheduled before they leave."--*RN* **Robust Information System /EHR** "What works well: (1) Electronic health record (EHR) set-up for reminder—this is a best practice; (2) put in hands of clinical staff through standing orders and standard practice; good system for call back; follow-up appointments for 2nd and 3rd shots before leaving."--*Industry* **Open to Outside Help** "Because some of the states are further ahead than we are and their rates are better. There have been some really good webinars like the CDC webinar from Florida and Georgia where the rates were worse than Virginia, but these small practices have really revved how they educated their patients, how they challenged their doctors and I think we can all learn from their successes."--*Community program*

411 Table 2. Themes and Exemplars Regarding HPV Vaccination Facilitators (*Continued*)

COMMUNITY	**Educational Outreach** "…CDC recommends that we try to educate the providers to push it as of the regular vaccines, just like any other school requirement….I think as more vaccine education is being done on HPV, which there is a lot of resources out there, but just getting it to the people that really need it." –*Health Dept* " "[The Cancer Coalition of Virginia] did a number of initiatives related to HPV for the last 5 years and have generated a lot of interest in making certain that HPV stays top of minds in public health."--C*ommunity program* "There definitely need to be consistent messaging across all sectors and then coordinated effort. We can't have one group saying one thing and another group recommending something else. Consistent and coordinated."--*Health Dept* **Engaged Community** "I think we have a really good health department. I think that anything they issue is very positive so we feel supported. I feel supported by them. There seems to be consistency in the message as compare to the family practice."--*NP* "I think that it's an engaged population more than other areas. I think the strengths is that we have the University and a lot of really great public health programs and resources for people to tap into."--*Community program* "We (Women's Health Virginia]) are also actively involved with the Cancer Action Coalition of Virginia and the cancer plan has a goal of increasing uptake of HPV vaccines."--*Community program* **Presence of Champion** "That's one of the reasons we brought an Adolescent Coordinator on."--*Health Dept*
POLICY	**Endorsed by Professional Organizations** "It's been promoted by the CDC. In the last year, CDC has had incredibly strong messaging. Every organizations that's out there promote/say, 'HPV vaccine...recommended for boys and girls, boys and girls." There's no medical organizations…there's no organization in organized medicine that doesn't recommend HPV vaccine." --*MD* **Affordable Care Act (ACA)** "Immunization is important prevention. Affordable Care Act focuses on prevention so can improve vaccination rate, but it will be slow going."--*Industry* *"*Clearly the ACA requires health insurance plans to offer screenings and vaccines and preventative services that are recommended by the US Preventive Services Task Force. And to the extent that any vaccine is recommended, then the ACA would provide coverage for that vaccine which could expand access to it."--*Professor*

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