



HPV Vaccination Communication Messages, Messengers, and Messaging Strategies

Kathleen B. Cartmell^{1,2} · Carlie R. Mzik¹ · Beth L. Sundstrom³ · John S. Luque⁴ · Ashley White⁵ · Jennifer Young-Pierce⁶

Published online: 27 July 2018
© American Association for Cancer Education 2018

Abstract

Human papillomavirus (HPV) causes over 39,000 cancers annually in the US. The HPV vaccine is safe and effective but underutilized to prevent cancer. In the US, only 37% of adolescents ages 13–17 have received the full vaccine series. Ineffective messages and misinformation about the vaccine have negatively impacted its uptake in the US. It was initially only approved for girls and early marketing focused on cervical cancer prevention and prevention of HPV as a sexually transmitted infection. Understanding effective messages and methods of dissemination is critical to address suboptimal vaccine uptake. Qualitative interviews were conducted with 34 participants to identify best practices for HPV vaccination messaging in SC. Participants included state leaders representing public health, medical associations, K-12 public schools, universities, insurers, and cancer advocacy organizations. Recommended HPV vaccine messages included focusing on cancer prevention rather than sexual transmission, routinizing the vaccine, and highlighting risks/costs of HPV. Targeting messages to specific demographics and utilizing multiple media platforms to disseminate consistent, scientifically accurate messages were recommended. Strategies such as appealing to parents' moral responsibility to protect their children against cancer and addressing the ubiquity of HPV and sharing growing evidence that HPV may be transmitted independent of sexual activity were also recommended. Suggested HPV vaccine messengers included trusted peers, medical professionals, and health associations. Culture-centered narratives to raise the voices of cancer survivors and parents were also recommended. This study provides an array of HPV vaccination messages and dissemination strategies for optimizing HPV vaccination rates.

Keywords HPV vaccination · HPV-related cancers · Communication · Environmental scan · Evaluation · Implementation

Introduction

Nearly a decade after the introduction of the human papillomavirus (HPV) vaccine, prevalence of genital HPV among US

adults ages 18–59 is still 45.2% in men and 39.9% in women [1]. The American Cancer Society expects 12,820 new diagnosed cases of invasive cervical cancer in 2017; virtually all of these cancers will be caused by HPV infection [2]. Although HPV is most commonly associated with cervical cancer, the CDC estimates that 31,500 cases of HPV-related cancers occur annually, including cancers of the cervix, vagina, vulva, penis, anus, rectum, and oropharynx [3]. The HPV vaccine is highly effective in preventing HPV infection, but tepid uptake has prevented maximal benefit in the US.

HPV vaccination rates in the US have steadily improved since Food and Drug Administration (FDA) approval in 2006 but remain substantially below target. In 2016, only about 60% of adolescents ages 13–17 had received one dose of the HPV vaccine, and only 43% had received all required doses [4]. Comparatively, 88% of adolescents had received the recommended tetanus, diphtheria, and pertussis (Tdap) vaccine [4]. This disparity in coverage was even more striking between males and females; at every age between 13 and 17,

✉ Kathleen B. Cartmell
cartmelk@musc.edu

¹ Medical University of South Carolina, College of Nursing, 99 Jonathan Lucas Street, Charleston, SC 29425, USA

² Hollings Cancer Center, Medical University of South Carolina, Charleston, SC, USA

³ College of Charleston, Charleston, SC, USA

⁴ Institute of Public Health, Florida A&M University, Tallahassee, FL, USA

⁵ Department of Public Health Sciences, Medical University of South Carolina, Charleston, SC, USA

⁶ University of South Alabama Mitchell Cancer Institute, Mobile, AL, USA

females were more likely to have received the HPV vaccine than their male peers, and only 38% of 13–17-year-old males received all required doses compared to 50% of females [4].

HPV vaccine messaging has negatively impacted its initial uptake in the US. Based on a systematic review, communication barriers have included general lack of HPV vaccination information/awareness and initial framing of the HPV vaccine as a vaccine against an STD (HPV) that is recommended for females [5]. Early marketing focused on the prevention of HPV as a sexually transmitted infection, raising concerns about sexual promiscuity [6, 7]. Furthermore, the HPV vaccine was first FDA-approved in the US exclusively for girls with a focus on cervical cancer prevention, which may have contributed to the gender disparity in vaccination rates [4]. Cervical cancer only accounts for about one third of all HPV-related cancers, and about 40% of all HPV-related cancers occur in males [8]. In 2016, the CDC recommended a 2-dose schedule (rather than the previous 3-dose schedule) for adolescents who initiate the vaccination series at ages 9–14 years, which may result in higher completion rates among adolescents.

Effective HPV vaccine messaging remains an important strategy to increase vaccine uptake, especially in South Carolina (SC) where HPV vaccination rates are below the national average [4]. Since 2006, the CDC has improved messaging on a national level, emphasizing the ubiquity of HPV, the HPV vaccine as a cancer-prevention measure, and the importance of the vaccine for all adolescents [9]. However, low vaccination rates in SC suggest that healthcare professionals and advocates need to operationalize these messages and maximize their effectiveness within the state.

In 2014, the National Cancer Institute selected 18 sites, including the MUSC Hollings Cancer Center, to carry out environmental scans to evaluate barriers, facilitators, and potential strategies for improving state-level HPV vaccination rates [10]. Our environmental scan consisted of interviews with state leaders, regional community focus groups, and focus groups with primary care practices. The current report describes communication strategies recommended for improving HPV vaccination rates in SC that emerged from interviews with state leaders.

Methods

Design This analysis reports on recommended messengers, messages, and messaging strategies for increasing HPV vaccination in SC. Thirty-four key informant interviews were conducted with state leaders from organizations whose roles had potential to address HPV vaccination policies and practices. This analysis was designed to gather feedback from the perspective of state leaders, a stakeholder group that may have considerable insight into best practices for public health

messaging that may be relevant to HPV vaccination, but for whom little has been published. On average, interviews lasted for 40 min (range 30–60 min). After each interview, participants completed a self-administered demographic survey. Participants were not compensated. The MUSC IRB reviewed the study protocol and deemed the primary purpose to be program evaluation, obviating need for IRB approval.

Participants and Setting Stakeholders were recruited via purposive sampling to identify leaders from organizations with potential to address statewide HPV vaccination policies and practices. Participants were recruited via three email invitations, followed by two phone calls to non-respondents. Contact attempts were spaced about 2 weeks apart. The state leaders who participated in interviews represented organizations that included large insurers, healthcare provider organizations, public health, state quality improvement collaboratives, K-12 schools, universities, non-profits and grassroots organizations that target cancer prevention and adolescent health, and state legislators. Among organizations invited to participate in interviews, all completed the interviews except for two legislators who were known as HPV vaccination opponents and one state university that did not reply to our invitation requests. Most interviews were conducted in person, but three were done by phone based upon stakeholder preference.

Data Collection, Management, and Analysis The primary data source was the key informant interviews. The semi-structured interview guide was developed by investigators with expertise in qualitative research, program evaluation, HPV, and cancer control and was pilot tested with two cancer control professionals prior to use, which helped to streamline and ensure neutral presentation of questions. The interview guide assessed best practices for improving HPV vaccination in SC. Generic questions included (a) stakeholder perceptions about HPV vaccination; (b) barriers, facilitators, and best practices for improving HPV vaccination; and (c) key partnerships and discussions needed for optimizing HPV vaccination rates. Each of the questions was carefully written to be neutral to minimize potential response bias. For example, to inquire about stakeholders' perceptions about HPV vaccination, we asked "What are your thoughts about HPV vaccination in South Carolina." Similarly, to ask about barriers to HPV vaccination, we asked "What are the barriers to HPV vaccination in our state?" with subsequent questions to follow up on each barrier listed by the participant. This same type of question framing was used for each of the questions on the interview guide.

Each interview was audiotaped and transcribed. Transcripts were reviewed by a second person for accuracy. A thematic content analysis approach was utilized [11]. Two investigators independently reviewed a sample of interview transcripts to develop a codebook for structuring formal data analysis.

Transcripts were coded, with emerging codes added to the codebook as needed. Preliminary results were shared with the research team for review and discussion. This iterative process was used to maximize valid interpretations of the interview data.

Results

Among the 34 key informants who participated in interviews, 73.5% were female, 82.4% were white, and 85.3% had a graduate degree or above; 38% were under the age of 45, 53.0% were 45–64, and 8.8% were 65 or older. Among these individuals who represented their state-level organizations, 14.7% represented the public health department, 14.7% physician associations, 2.9% pharmacy organizations, 8.8% insurers, 8.8% QI collaboratives, 2.9% department of education, 2.9% school nurses association, 11.8% university school health programs, 8.8% state legislators, 17.6% grassroots cancer prevention organizations, and 5.9% adolescent health organizations. Of note, we interviewed all individuals in the state who we were aware of that had led state-level HPV vaccination efforts ($n = 5$), such as grassroots community engagement, pediatric quality improvement initiatives, and legislative efforts to make the HPV vaccine mandatory for middle school and/or to require education about the vaccine in middle schools. Themes emerged from the interviews centered on the identification of optimal HPV vaccination messengers, messages, and messaging strategies.

HPV Vaccine Messengers As presented in Table 1, identifying appropriate messengers emerged as a central concern among most participants who agreed that information about HPV vaccination needs to come from the right source to be the most effective. One participant stated, “It’s your messenger as much as your message,” and this sentiment was echoed throughout the interviews. Participants recommended utilizing messengers in three categories: national and state health organizations, community-based organizations, and peers.

National and State Health Organizations Participants identified individuals representing state and national health agencies who could serve as messengers, such as American Academy of Pediatrics, CDC, Cervical Cancer-Free SC, SC Department of Health and Environmental Control, MUSC Hollings Cancer Center, SC Academy of Family Physicians, SC Medical Association, and health insurers. Multiple participants stressed the value of public endorsements or “stamps of approval” from leaders representing these entities to lend a sense of expertise and authority to HPV vaccine messaging. Participants also identified familiarity and respect as important factors in the credibility of spokespersons and recommended local health professionals, such as primary care providers and

school nurses as messengers who may be most effective in communicating HPV information and increasing vaccine uptake.

Community-Based Organizations Other trusted community-based authorities may also serve as messengers, and many participants suggested partnering with local Parent Teacher Associations and faith-based and community organizations. Leaders in these organizations offer a valuable platform for disseminating information and may be seen as more trustworthy than sources from outside the community; “If that message is coming from someone seen as a physician or an outsider then it is often times not that well received.” To further bridge the gap between a trusted local authority and an outside medical authority, one participant suggested utilizing healthcare-related student organizations or medical students from a local university to emphasize education and show support, stating: “That educational component needs to be involved and so do the younger people, maybe even medical students. They came to our hearings for Smoke-free Charleston in their white coats and it was a really great appearance.”

Peers Several participants identified peers as important messengers who, along with community and medical authorities, may encourage vaccine uptake. Adolescents who hear about the HPV vaccine from friends may be more likely to advocate for the vaccine for themselves, and parents may be similarly likely to take advice from other parents. One participant reported, “Parents put some stock in their doctor generally speaking, but parent to parent communication has been critical for us.” Peer-to-peer interaction was also identified as a means of promoting the HPV vaccine among healthcare providers. One participant suggested utilizing messengers within the same profession to promote the vaccine among peers, because “nurses don’t want to hear from doctors about how to do their job.”

HPV Vaccine Messages As described in Table 2, participants identified six HPV vaccination messages and communication strategies that may be instrumental in increasing uptake: focusing on cancer prevention instead of sexual transmission, highlighting the high risk for acquiring HPV, comparing HPV-related cancers to other cancers, appealing to parents’ moral obligation to protect their children, emphasizing the need for both boys and girls to be vaccinated, integrating the HPV vaccine into the routine schedule of adolescent vaccination, and tailoring messages to ethnic and cultural groups.

Focus on Cancer Instead of Sexual Transmission Concern among the general population about sex and sexual activity is a significant barrier in receiving the HPV vaccine. Perhaps the most popular topic related to HPV vaccine messages was the need to distance HPV from sexual activity and focus on cancer

Table 1 HPV vaccine messengers

Sub-theme	Quotes
Theme: health professionals and organizations	
Trusted local providers	<ul style="list-style-type: none"> • We need to have information come from somebody that they trust like their healthcare providers and school nurses. • For that crowd at the general assembly, they need to hear from 5 of their local doctors. Those are respected professionals who can counter some of that. The medical community will have to take a much stronger stand on this.
Medical organizations	<ul style="list-style-type: none"> • Support from trusted sources could help to strengthen the HPV vaccine message. We need to look to see what researchers at HCC are saying about the vaccine. We also need to get support for the vaccine message from groups such as pediatric associations and health insurers. • Get a state chapter of family physicians on board to give stamp of approval so it comes from someone a little higher. • Get support from the Medicaid medical directors. We do have a quarterly meeting of the Medicaid County medical directors where you could say what you are doing and ask for support.
Public health entities	<ul style="list-style-type: none"> • Try to get support from DHEC and all of their branches/offices for a stamp of approval. • Recommendations from the CDC and DHEC are key; but that comes along with education. • We at DHEC give a simple consistent message to everyone. Focus on the vaccines that the adolescents need.
Theme: community leaders and organizations	
Community organizations	<ul style="list-style-type: none"> • So if you can get the leaders of those churches on board and start with them one-on-one then explain it to the congregations or get the parish nurses or laypeople, which is what we use for witness. (...) If that message is coming from someone seen as a physician or an outsider then it is often times not that well received. • Work with PTAs. Engage the faith community. If they approve things...people are more likely to get vaccinated.
Local public figures	<ul style="list-style-type: none"> • There is a distrust of government and there is this concern over experimenting. There is a lot of misunderstanding associated with a brand-new vaccine and questions about why we are testing it out on children first. Local community folks could give you a lot of help because if you go into certain counties you want that county's folks endorsing you.
Healthcare students	<ul style="list-style-type: none"> • That educational component needs to be involved and so do the younger people, maybe even medical students. They came to our hearings for Smoke-free Charleston in their white coats and it was a really great appearance. The HOSA, Health Occupations Students Association at high schools helped us on some physical activity and nutrition stuff.
Theme: peers	
Children	<ul style="list-style-type: none"> • For us it is helpful to use peer-to-peer recommendation; when students tell other students that they got it and why.
Parents	<ul style="list-style-type: none"> • Parents put some stock in their doctor, but parent-to-parent communication has been critical for us.
Healthcare professionals	<ul style="list-style-type: none"> • We have had to get very market specific in terms of our presentations. Nurses don't want to hear from doctors about how to do their job. We have to identify the right messenger.

prevention: “As a global comment in South Carolina, the HPV vaccine is tied to sex. It is not tied to cancer prevention. That’s a messaging problem.” Multiple participants reiterated this sentiment and suggested that sexual activity and transmission have played too large a role in prior messaging efforts, distracting the public from the purpose of vaccination and discouraging parents from participating. One participant asserted, “we need to focus on the cancer angle and not on sexual activity. CDC put too much focus on sexual transmission.”

To avoid predominant cultural perceptions about the vaccine and sexual activity, several participants offered specific recommendations to approach the issue. One participant suggested opening a conversation with wary parents by first acknowledging their child is *not* sexually active, “because of the outstanding parents they are, we know that they would want their children to be protected in case they do become sexually active.” Another, more tongue-in-cheek response suggested extraordinary denial about adolescents and sex: “If we change

the message to preventing cancer, this would resonate more than focusing on the sexual part. We are in the Bible Belt. There is no sex going on.” Another participant recommended circumnavigating sexual transmission by focusing on less explicit forms of transmission, such as kissing. “It would be more palatable for a parent to think they need to protect their child from a kissing exposure.” In every case, participants who recommended decreasing focus on sexual transmission also recommended simultaneously increasing awareness of the causal link between HPV and cancer, “it needs to get out there this is not a sex vaccine; it is a cancer vaccine.”

Compare Cervical Cancer to Other Cancers To educate the public about the risks of HPV, multiple participants recommended comparing cervical cancer to other more widely known forms of cancer. Breast cancer was the most popular comparison, and one participant stated, “Cervical pre-cancer is a very common problem that occurs more often than breast

Table 2 HPV vaccine messages

Sub-theme	Quotes
Theme: focus on cancer instead of sexual transmission	
Emphasize cancer, not STDs	<ul style="list-style-type: none"> • We need a campaign based on preventing unnecessary cancer, and not sexually transmitted diseases. • It needs to get out of there that this is not a sex vaccine; it is a cancer vaccine. • If we change to message to preventing cancer, this would resonate more than focusing on the sexual part. We are in the Bible Belt. There is no sex going on. • We need to focus on the cancer angle and not on the sexual activity. CDC put too much focus on sexual transmission. • As a global comment in South Carolina, the HPV vaccine is tied to sex. It is not tied to cancer prevention. That's a messaging problem. • We need to say that we know their child is not sexually active but because of the outstanding parents that they are, we know that they would want their children to be protected in case they do become sexually active. • Would make the education easier if we could say that people get HPV through kissing. It would be more palatable for a parent to think they need to protect their child from a kissing exposure. • It's about cancer; it's not about genital warts.
Cervical cancer is preventable	<ul style="list-style-type: none"> • This is the only vaccine that is available for preventing cancer. • We need messages to get the word out that this is here; it's cancer prevention and it's safe.
Theme: compare cervical cancer to other cancers	
Compare cervical cancer with other cancers	<ul style="list-style-type: none"> • If there was a vaccine to prevent breast cancer, I don't know anybody who would turn it down. • Cervical pre-cancer is a very common problem that occurs more commonly than breast cancer. • If you had the opportunity to vaccinate your child against breast cancer you would take it in a minute (...)
Theme: appeal to moral responsibility	
Appeal to moral responsibility to prevent cancer	<ul style="list-style-type: none"> • Cervical pre-cancer is a very common problem that occurs more commonly than breast cancer. Just most of time we catch it. But do you really want your daughter to be the one that we catch with cancer? And lastly, cervical cancer is devastating and life threatening and still happens. • If you can prevent cancer, why not?
Theme: routinize HPV vaccinations	
Remind parents providers may refuse to see unvaccinated children	<ul style="list-style-type: none"> • When a patient refuses all vaccines, I let them know that as a practice we have decided not to see unvaccinated children because of the risk for the other children coming to their appointments. That typically ends the conversation and many choose to get vaccinated.
Normalize HPV as part of the normal vaccination routine	<ul style="list-style-type: none"> • It should just be in the battery of vaccines. When it is presented as here are the vaccines that your child is going to get, mumps, measles, HPV, people are fine; but it is when you ask and the doctor says mumps measles and then you have the option for HPV and then people ask what it is and then they do not get it (...). Evidence says if you want them to get that vaccine lump it all in. • Present the HPV vaccine as one of the vaccines children needs at their visit, not separate from mandatory vaccines. • Present HPV vaccination a part of the regular vaccine schedule, rather than a separate vaccine. • You bring your child here from the time they are months old to get them their immunizations, why would you not follow through with the rest of the recommended immunizations for your child?
Theme: emphasize vaccine uptake among males	
Educate on eligibility	<ul style="list-style-type: none"> • More awareness about male cancers will help. I talk to a lot of my friends whose sons have not been vaccinated. They say he's 23 and I say it's not too late.
Educate on specific risks for males	<ul style="list-style-type: none"> • Some of the allies that we work with to promote HPV vaccination had no idea that boys could get it and that it could cause some cancers in boys. This message needs to be shared.
Theme: prevention as a cost-effective measure	
Cost benefit of HPV vaccination	<ul style="list-style-type: none"> • Push the indirect cost savings of preventing cervical cancer. • Keeping South Carolinians healthy, in shape, and this is an easy way to prevent cancer-focus on the preventative aspect. From a financial standpoint, if you get this, it's going to save us much more in the long run (focus for messaging with key stakeholder leaders).
Theme: tailored messaging	
Identify culturally credible messengers	<ul style="list-style-type: none"> • They are doing studies on what messengers that different cultures tend to listen to. We could have champions in each cultural group--champions who can communicate with the people. For example, Shaq O'Neal with back pain treatment. Native Americans will listen to those who have a title and a little clout. In Hispanic communities, men need to do the talking. • Be culturally appropriate with the marketing. Make the message sensitive to the population being targeted.

Table 2 (continued)

Sub-theme	Quotes
Specific strategies for AA community	<ul style="list-style-type: none"> • To help overcome fears about the vaccine, we could educate folks we are not running a clinical trial on them. This is proven medicine that works. This is not one group taking advantage of another group; this is to save lives. • We had to be very cautious using the word sex and we still do. But because HIV has hit the African-American community so hard, that stigma has kind of gone away.
Low-literacy groups	<ul style="list-style-type: none"> • To advocate with more underserved and disparate vaccination, sixth to eighth grade reading level is the sweet spot.
Non-English-speakers	<ul style="list-style-type: none"> • Make sure any informational packets for the patients are bilingual.
Religious groups	<ul style="list-style-type: none"> • Find a way to frame the HPV vaccine message that God gave us a way to prevent a cancer. I think that would be very important for those with religious or moral reasons. <p>If we change to message to preventing cancer, this would resonate more than focusing on the sexual part. We are in the Bible Belt. There is no sex going on.</p>

cancer. Just most of the time we catch it. But do you really want your daughter to be the one that we catch with cancer? And lastly, cervical cancer is devastating and life threatening and still happens.” Another participant drew attention to the unique nature of the HPV vaccine, pointing out that other cancers are not associated with an identifiable, preventable virus: “If you had the opportunity to vaccinate your child against breast cancer you would take it in a minute (...) this is the only vaccine that is available for preventing cancer.”

Appeal to Moral Responsibility In addition to minimizing the association between sex and HPV, another common theme was an appeal to parents’ sense of duty and moral responsibility for the well-being of their children. A majority of participants posed some version of a rhetorical question asking why anyone would neglect their child’s health and presented HPV vaccination as a moral imperative. One participant said, “Same as with other diseases, the chance is very low to get cervical cancer, but do you want your child to be the one that gets cervical cancer?” Another simply asked, “Why would you not protect your child?”

Emphasize Vaccine Uptake Among Males Another messaging issue specific to this vaccine concerns gender; multiple participants recommended explicitly addressing males and their risks for HPV-related cancers. Two participants pointed to pervasive misperceptions about HPV being a problem that only affects females and mentioned personal examples of peers who were unaware of when or why boys should be vaccinated. One participant commented, “Some of the allies we work with to promote HPV vaccination had no idea that boys could get it and that it could cause cancers in boys. This message needs to be shared.”

Routinize HPV Vaccines Some participants suggested it would be beneficial to normalize the HPV vaccine as one of the many standard childhood vaccines, not as an

extra or optional vaccine. One participant explained that treating HPV just like MMR and DTAP, “gives it more strength and credibility,” elevating the seriousness of HPV and encouraging more people to receive the vaccine. Including the HPV vaccine in the battery of normal adolescent vaccines may also motivate parents to comply with vaccination recommendations. One participant cited experiences with providers who choose not to treat children who do not have all the recommended vaccines: “That typically ends the conversation, and many choose to get vaccinated.”

Indirect Cost-Savings of Preventing Cancer Some participants pointed out that, as a preventive measure, the HPV vaccine can reduce overall healthcare costs by reducing the need for cancer diagnostics and treatment. This may be an important point to discuss with “key stakeholder leaders” who may be interested in the benefits of the vaccine from a financial perspective.

Targeted Messaging Though a less common topic, some participants provided recommendations for targeted messaging. Some participants identified increased need for sensitivity and consideration regarding messaging to specific populations, such as ethnic/cultural groups and religious communities. According to one participant, an effective strategy included identifying the most effective messengers within different cultural groups, such as elders/authority figures in the Native American community or men in the Hispanic community. Recommendations regarding religious communities included framing the vaccine as a gift from God, as well as distancing HPV messaging from sexual activity. Conversely, one participant suggested that messages directed to the African American community may not need to be as cautious regarding sexual transmission of HPV, stating, “because HIV has hit the African American community so hard, that stigma has kind of gone away.” Two participants also identified the need

to evaluate educational materials for use with bilingual and low-literacy populations, emphasizing readability at a third-grade level.

HPV Messaging Strategies As presented in Table 3, participants identified several general messaging strategies to increase HPV vaccine uptake. Most frequently, participants recommended communicating messages across multiple media (e.g., traditional and new media), consulting with public health and marketing experts, and utilizing personal stories and scientific data to increase credibility and present consistent messages.

Communicate Across Multiple Media Participants suggested using social and entertainment media such as YouTube and Facebook to relay messages. Another participant recommended entertainment events, such as live performances, fairs, and farmers' markets to promote HPV education, saying "Out of our university's sexual health office, we often do unrelated social events first to break the stigma instead of just pushing the vaccine. Students may come to the event because they want to see a competitive dance show but there is also educational information to raise awareness. It draws in people who may not otherwise come to the event." Similarly, another participant pointed to a study that showed an increase in subjects' knowledge about HPV after encountering educational materials in fraternity/sorority meetings and primary care clinics.

Consult with Experts To maximize the impact of messages across multiple media platforms, many participants suggested collaborating with experts, such as marketing and social media professionals. Public health experts were also identified as resources to help craft the most effective messages, which should be clear and concise. One participant recommended, "identify the very best message and stick with it across time and communities."

Share Personal Stories Several participants stressed the value of personal stories in communicating HPV risks and making messages more personally relatable. Since first-hand experiences may resonate on a more personal level, stories from cancer survivors, parents who have already vaccinated their children and peers who have received the vaccine were identified as potential vignettes to include in vaccine messages. One participant, referencing the case of a mother of two who was recently diagnosed with cervical cancer, stated, "I think it would be great for someone like her to say 'I had cervical cancer, and I would have loved to have known about the vaccine.'" Another participant stated that this strategy would provide "a powerful perspective to see how people who have already gone through cancer feel about getting a vaccine that can prevent another cancer." Another participant referenced an example of how personal stories from public figures can

raise awareness and influence legislators. "That's an unfortunate truth about how the politics work. Only when a conservative legislator who had colorectal cancer made connections with the legislature and got into advocating for colorectal cancer prevention and screening very forcefully, then we had colorectal cancer funding again in South Carolina."

Present Scientific Data To further boost credibility, several participants suggested that messages should incorporate reliable scientific data. Several participants advocated disseminating sound research data to decrease skepticism about the HPV vaccine's efficacy, safety, and necessity: "There is the statistical data about how many people have been vaccinated; how safe it is; how it has been even more effective than we thought it would be. That's a story that is not getting enough press. The fact that 60% of girls have gotten the vaccine is remarkable. Anytime you can tell a positive story, it needs to be told." Another participant suggested that outcome data from Australia, where the HPV vaccine has been in use longer than in the US, could be "an important tool for educating providers." Participants advocated for use of scientifically accurate data not only to promote the HPV vaccine, but also to combat misconceptions and "ensure we are debunking the myths that are perpetuated." Some of the myths participants identified that should be addressed included the (disproven) belief that vaccines may cause autism, or that the HPV vaccine encourages promiscuity. Data may reassure concerned parents, and one participant offered "The HPV vaccine shows no evidence that it increases sexual activity or contraction of other STDs."

Discussion

Although HPV vaccination communication remains widespread, ineffective messages are a barrier to vaccine uptake [5]. Interview participants recommended a strategic comprehensive approach to HPV vaccine messaging. Many suggestions aligned with recent CDC health communication recommendations, which include working with partners such as Cervical Cancer-Free America and presenting the HPV vaccine to parents as cancer prevention [12]. The most recommended trusted messengers included healthcare organizations and providers, patient and parent peers, and local public figures. Findings elaborated extant research showing the success of peer-to-peer messaging [13] and the synergistic effectiveness of combining expert and peer narratives [14].

Participants recommended crafting messages that appeal to parents' moral responsibility to protect children against cancer. This finding resonates with a recent study which reported moral values, such as purity and liberty were associated with vaccine hesitancy [15]. Messages that emphasize HPV vaccination as a parental responsibility and personal choice may

Table 3 HPV vaccine messaging strategies

Sub-theme	Quotes
Theme: communicate across multiple media	
YouTube	<ul style="list-style-type: none"> • I am not sure what the financial status is of all this, but you can YouTube. Other campaigns put their YouTube commercials out there and then just link it to social media.
Public service announcements	<ul style="list-style-type: none"> • The more conservative areas are where the PSAs need to go.
HPV story line on TV	<ul style="list-style-type: none"> • In theory a lot of stuff is featured on popular shows and then it is ok. It normalizes the behavior.
Use social/entertainment venues as a platform to talk about HPV	<ul style="list-style-type: none"> • Out of our USC sexual health office we often do unrelated events first to break the stigma instead of just pushing the vaccine. Students may be coming to the event because they want to see a competitive dance show but there is also educational information to raise awareness. It draws in people who may not have otherwise come to the events. We also tie in health information to unrelated events like our farmers market. We often have a health table at our farmers markets to offer screening and other services and information while students are out shopping for their fruit.
Use passive programs (printed material) to spread information	<ul style="list-style-type: none"> • In 2013, we worked with a group of medical students who did something called the cervix project. They partnered with us and we had educational handouts about HPV vaccination available in all of our clinics. We also did presentations at sorority meetings for peer to peer interaction. Having this information in the waiting rooms increased knowledge about HPV and vaccination. They found that the handout was more effective but that they both increased knowledge and education. They thought that the pamphlet maybe allowed students to take in the information on their own instead of in a slightly awkward social setting.
Theme: seek guidance from experts	
Health organizations	<ul style="list-style-type: none"> • From the DHEC Bureau of Disease Control perspective, it would be really nice to have (HCC) guidance about appropriate language that would resonate with parents and students who would be eligible to receive the vaccine. DHEC does flu clinics in schools. If HPV were added at some point to school-based vaccine clinics, we could use assistance with wording and support for vaccination from state partners like HCC. • Look at our messaging compared with the CDC health promotion materials. • We have been working with the Cervical Cancer Free South Carolina and the National Cervical Cancer Coalition South Carolina Chapter to just put on events, educate legislatures, put out press releases and remind our clinic staff to remind our patients that we offer the vaccine. • We need to look to see what researchers at HCC are saying about the vaccine.
Social media expert	<ul style="list-style-type: none"> • Expertise in social media engagement would be needed. For example, how often do you need to post, how many times do you need to tweet?
Theme: share personal stories	
From cancer survivors	<ul style="list-style-type: none"> • It is beneficial to have someone who has been through the experience first hand to provide education about things that evoke fear or concern: Like a patient who's had it and why. Certainly take the time and effort to find people who are willing to speak out. We are starting at a grassroots level to have the conversation and start breaking down barriers. • We talked to a patient diagnosed with cervical cancer about 2 years ago and she knew nothing about HPV. She has 2 kids, had not had a pap smear in 5 or 6 years, had some problems and they told her she had cervical cancer. I think someone like her would be great to say I had cervical cancer, and I would have loved to have known about the vaccine. • I wonder if we could reach out to those who tested positive for HPV to get their initial thoughts and feelings. • This would be a powerful perspective to see how people who have already gone through cancer feel about getting a vaccine that can prevent another cancer. • They need to see people who have cervical cancer and then be reminded that it is preventable. The same thing happened with the meningitis vaccine but once people saw children who went through it, then it finally soaked in.
From parents who have vaccinated their children	<ul style="list-style-type: none"> • I think one of the strongest things I can say to my patients is that I gave this vaccine to my daughters.
From public figures with power/influence	<ul style="list-style-type: none"> • That's an unfortunate truth about how the politics work. Only when a conservative legislator who had colorectal cancer made connections with the good old boy network in the legislature and got into advocating for colorectal cancer prevention/screening very forcefully, then we had colorectal cancer funding again in SC. It's your messenger as much as your message. • People's stories resonate with people. Have a spokesperson say, "no woman in the US should die from cervical cancer." Cervical cancer can be very bad. We need to humanize it for people.
Theme: present scientific data	
Present consistent, scientifically sound evidence about safety and efficacy	<ul style="list-style-type: none"> • Identify the very best message and stick with it across time and communities. We live and die by the Surgeon General's Report. Even the most jaded legislators pay attention to the Surgeon General's Report and understand that it is an unquestionable scientific document.

Table 3 (continued)

Sub-theme	Quotes
	<ul style="list-style-type: none"> • Really need to say the vaccine is safe. Despite hundreds of millions of doses, it's still a concern. • There is the statistical data about how many people have been vaccinated; how safe it is; how it has been even more effective than we thought it would be. That's a story that is not getting enough press. The fact that 60% of girls have gotten the vaccine is remarkable. That's a good story. Anytime you can tell a positive story, it needs to be told. • We need to have scientifically accurate messages delivered to these people to ensure we are debunking the myths that are perpetuated. • Researchers already provide some evidence of its effectiveness. Could show data from Australia for drop in cancer and data from US for drop in dysplasia. Could share the early evidence that it works. These data could be an important tool for educating providers.
Address and dispel myths	<ul style="list-style-type: none"> • The HPV vaccine shows no evidence that it increases sexual activity, contraction of other STDs, or additional sexual partners. • As with measles and autism, has there been misinformation out there that we can clear up?

influence vaccine-hesitant parents. Participants also identified HPV's link to sexual activity as a significant problem with previous messages, particularly in SC which has a large Christian population. Innovative messages may address the ubiquity of HPV and share growing evidence that HPV may be transmitted independent of sexual activity via skin to skin contact [16]. Participants also recommended disseminating CDC messages that emphasize cancer prevention and the risks of HPV. Messages that improve knowledge about transmission and prevention of HPV may improve vaccine uptake [17–19]. Other HPV-specific messages included promoting male vaccination and routinizing the HPV vaccine series. Many of these suggestions align with constructs from behavioral models such as the Health Belief Model and Social Cognitive Theory [20], such as conveying high risk for HPV infection, severity of illness (cancer) associated with HPV disease, cue to action that it is parents' responsibility to protect children from known risks, and normalizing HPV vaccination as standard practice.

Recommended messaging strategies for increasing vaccine uptake included utilizing personal stories from cancer survivors and parents who have vaccinated their children. Audience-generated messages offer an effective strategy in health communication campaigns [21]. Participants also suggested employing narratives to emphasize how common cervical pre-cancer remains among women. According to the CDC, over 300,000 US women experience invasive testing and treatment for cervical pre-cancer that can result in mental and physical harms, such as cervical instability leading to preterm birth. Participants also recommended a culturally tailored messaging approach. This finding builds on extant research highlighting the role of racial disparities and sociocultural values on HPV vaccination decision-making [22, 23]. Stakeholders also described the need to utilize credible experts to deliver scientific data to emphasize safety and efficacy and communicate across multiple media platforms to engage a wider audience. Participants also recommended seeking advice from media experts regarding the most effective

strategies. These recommendations for messaging strategies provide a blueprint for developing a media campaign supported by Communication Theory [20], which describes the need to develop media campaigns that rely upon optimal messengers and message platforms, with message targeting at the group level and tailoring at the individual level as needed to reach intended audiences with appropriate messages.

To date, there is limited evidence to evaluate the effect of HPV vaccination awareness campaigns on HPV vaccination rates. Findings from a recent national environmental scan suggest that many awareness campaigns have been conducted, but rigorous evaluation of these campaigns is limited [24]. Evaluations most commonly reported HPV vaccination process measures (e.g., web/phone traffic, provider use of educational materials, HPV vaccine awareness), and among two studies that evaluated actual HPV vaccination rates, results were mixed [24]. A recent HPV vaccination campaign conducted in Ireland provides insight into how one country implemented rapid and effective communication strategies for improving HPV vaccination rates [25]. An evaluation was first conducted to assess the underlying reasons for low vaccination rates, which was followed by a national HPV vaccination campaign. An HPV vaccination alliance was formed with 35+ organizational partners working in health, women's rights, child welfare, and the public, followed by a media campaign widely supported by members of the alliance and senior politicians. As part of a multi-level approach, HPV vaccine print and online materials were revised and short videos were created, which were housed on a WHO-accredited website, a comprehensive provider training program was implemented, and unvaccinated girls were offered another opportunity for vaccination. Over the campaign period, first dose HPV vaccination rates for girls increased from 50% in 2016–17 to 62% in 2017–18 [25]. These findings suggest thoughtful baseline evaluation, coupled with subsequent coordinated multi-level strategies to address identified vaccination barriers may rapidly yield robust improvements in HPV vaccination uptake.

Our interviews relied on expert opinions from professionals from numerous organizations in SC, but it is possible that informants were not entirely impartial representing their respective organizations. This evaluation may have also benefitted from interviews with HPV vaccination opponents who could offer a more complete picture of barriers to vaccine uptake. Unfortunately, SC legislators who had opposed state vaccine legislation declined to participate in interviews.

This study provides robust insight from SC leaders whose roles afford them opportunity to influence HPV vaccination policy and practice in a state where HPV vaccination rates are among the lowest in the country. While the study was conducted in SC, a state where HPV vaccination rates have been historically low, the results were strikingly similar to what has been reported nationally, suggesting these results may be generalizable to other states in the US. To increase HPV vaccine uptake, health professionals and advocates will need to disseminate effective messages both at the state and grassroots community level. This scan identified three elements of effective messages: 1) appropriate messengers, 2) factual messages about HPV and the vaccine with a focus on overcoming misunderstanding about the vaccine's purpose and target groups, and 3) strategic communication to ensure effectiveness and reach of messages to the intended audience.

Acknowledgments The authors would like to thank the leaders across the state of South Carolina who generously gave of their time to participate in interviews.

Funding Information This project was funded by the National Cancer Institute through grant no. 3P30CA138313-06S2.

References

- McQuillan G, Kruszon-Moran D, Markowitz LE, Unger ER, Paulose-Ram R Prevalence of HPV in adults aged 18–69: United States, 2011–2014. *NCHS Data Brief* 2017(280):1–8
- American Cancer Society. What are the key statistics about cervical cancer? About cervical cancer 2017; <https://www.cancer.org/cancer/cervical-cancer/about/key-statistics.html>. Accessed November 1, 2017
- CDC. Number of HPV-attributable cancers per year. *HPV and Cancer* 2017; <https://www.cdc.gov/cancer/hpv/statistics/cases.htm>. Accessed October 31 2017
- Walker TYE-E, Laurie D, Singleton JA, Yankey D, Markowitz LE, Fredua B, Williams CL, Meyer SL, Stokley S (2017) National, regional, state, and selected local area vaccination coverage among adolescents aged 13–17 years — United States, 2016. *MMWR* 66: 874–882
- Holman DM, Benard V, Roland KB, Watson M, Liddon N, Stokley S (2014) Barriers to human papillomavirus vaccination among US adolescents: a systematic review of the literature. *JAMA Pediatr* 168(1):76–82
- Daley EM, Vamos CA, Thompson EL, Zimet GD, Rosberger Z, Merrell L, Kline NS (2017) The feminization of HPV: how science, politics, economics and gender norms shaped U.S. HPV vaccine implementation. *Papillomavirus Res* 3:142–148
- Gottlieb SD (2013) The patient-consumer-advocate nexus: the marketing and dissemination of gardasil, the human papillomavirus vaccine, in the United States. *Med Anthropol Q* 27(3):330–347
- Viens LJ, Henley SJ, Watson M, Markowitz LE, Thomas CC, Thompson TD, Razzaghi H, Saraiya M (2016) Human papillomavirus-associated cancers - United States, 2008–2012. *MMWR Morb Mortal Wkly Rep* 65(26):661–666
- CDC. HPV vaccines: vaccinating your preteen or teen. 2017; <https://www.cdc.gov/hpv/parents/vaccine.html>. Accessed November 7, 2017
- National Cancer Institute. HPV vaccine uptake in cancer centers. Healthcare delivery research program 2017; <https://healthcaredelivery.cancer.gov/hpvuptake/>. Accessed November 27, 2017
- Bernard HR, Wutich A, Ryan GW (2017) Analyzing qualitative data: systematic approaches, Second edn. Los Angeles, SAGE
- CDC. Partner spotlight. Human papillomavirus (HPV) 2017; <https://www.cdc.gov/hpv/partners/partner-spotlight.html>
- Hopfer S, Clippard JR (2011) College women's HPV vaccine decision narratives. *Qual Health Res* 21(2):262–277
- Hopfer S (2012) Effects of a narrative HPV vaccination intervention aimed at reaching college women: a randomized controlled trial. *Prev Sci* 13(2):173–182
- Amin AB, Bednarczyk RA, Ray CE, Melchiori KJ, Graham J, Huntsinger JR, Omer SB (2017) Association of moral values with vaccine hesitancy. *Nature Hum Behav* 1(12):873–880
- Liu Z, Nyitray AG, Hwang LY, Swartz MD, Abrahamsen M, Lazcano-Ponce E, Villa LL, Giuliano AR (2018) Acquisition, persistence, and clearance of human papillomavirus infection among male virgins residing in Brazil, Mexico, and the United States. *J Infect Dis* 217(5):767–776
- Mills LA, Head KJ, Vanderpool RC (2013) HPV vaccination among young adult women: a perspective from Appalachian Kentucky. *Prev Chronic Dis* 10:E17
- Cohen EL, Head KJ (2013) Identifying knowledge-attitude-practice gaps to enhance HPV vaccine diffusion. *J Health Commun* 18(10): 1221–1234
- Donadiki EM, Jimenez-Garcia R, Hernandez-Barrera V et al (2014) Health belief model applied to non-compliance with HPV vaccine among female university students. *Public Health* 128(3):268–273
- National Cancer Institute (2005) Theory at a glance: a guide for health promotion practice. National Cancer Institute, Bethesda
- Krieger JL, Coveleski S, Hecht ML, Miller-Day M, Graham JW, Pettigrew J, Kootsikas A (2013) From kids, through kids, to kids: examining the social influence strategies used by adolescents to promote prevention among peers. *Health Commun* 28(7):683–695
- Bynum SA, Brandt HM, Annang L, Friedman DB, Tanner A, Sharpe PA (2012) Do health beliefs, health care system distrust, and racial pride influence HPV vaccine acceptability among African American college females? *J Health Psychol* 17(2):217–226
- Vanderpool RC, Cohen E, Crosby RA et al (2013) “1-2-3 pap” intervention improves HPV vaccine series completion among Appalachian women. *J Commun* 63(1):95–115
- Blasi PR, King D, Henrikson NB (2015) HPV vaccine public awareness campaigns: an environmental scan. *Health Promot Pract* 16(6):897–905
- Corcoran B, Clarke A, Barrett T (2018) Rapid response to HPV vaccination crisis in Ireland. *Lancet* 391(10135):2103