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SHORT REPORT

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Barriers and facilitators to HPV vaccination in rural South Carolina pharmacies: a qualitative investigation

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Abstract

Introduction As many as 14 million people contract a new case of HPV each year in the United States, with over 37,000 HPV cancers diagnosed each year. However, HPV vaccination coverage varies greatly with disparities by population and region. In rural areas, HPV vaccination rates for adolescents are significantly lower (12%) than for teens living in urban areas while HPV cancer rates are higher comparatively. Pharmacy-based vaccination services reduce accessibility barriers, as approximately 90% of Americans live within five miles of a community pharmacy. Unfortunately, implementation of HPV vaccination in community pharmacy settings remains low. Therefore, the objective of this study was to identify perceived barriers and facilitators to HPV vaccination services among South Carolina pharmacists.

Methods Qualitative interviews with community-based pharmacists practicing in rural South Carolina were conducted from August-December 2021. Community pharmacists practicing in areas with primary Rural–Urban Commuting Area (RUCA) codes of 4 and above were invited to participate in this study. Recruitment continued until point of saturation. Interviews were approximately 30 min in length and conducted using a semi-structured guide. Interview questions were open-ended and designed to elicit barriers and facilitators to administering the HPV vaccination in a pharmacy setting. All interviews were audio-recorded and transcribed. Transcripts were deductively coded using the Consolidated Framework for Implementation Research (CFIR), using NVivo to manage and analyze data.

Results Ten pharmacists participated in the qualitative interviews. Fourteen CFIR constructs were identified during qualitative analysis and interpretation. Applying the CFIR rating rules, seven constructs were found to have a strong influence (+2 or -2). Constructs with a strong positive influence, and indicated as facilitators, included "patient needs and resources" and "cosmopolitanism", while constructs with a strong negative influence, and indicated as barriers, included "design quality and packaging", "cost", "available resources", "external policy and initiatives", and "innovation participants".

Conclusion Multiple barriers and facilitators were identified as impacting HPV vaccination in rural South Carolina community pharmacies. Addressing these barriers may improve pharmacy-based HPV vaccination services, thereby improving access in rural communities. Findings from this study will be used to develop implementation strategies to increase administration of the HPV vaccine in pharmacy settings.

Keywords Human papillomavirus, Prevention, Community pharmacy, Rural, Vaccines, Health facilities

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Contributions to the literature

- Identification of factors to be avoided or exploited: clearly identifying barriers and facilitators to HPV vaccination can lead to exploitation of aspects that work well, creating more effective HPV vaccination programs.
- Richness of data: individual interviews provide a richness of data that may be lacking in survey format questions.

Introduction

The national rate for adolescents up to date with the Human papillomavirus (HPV) vaccination series was 62.6% in 2020 (95% CI: 61.1–64.0%) [1], while the rate for South Carolina [SC] adolescents was 47% [2]. HPV vaccination rates for teens living in rural areas are significantly lower (12%) than teens living in urban areas, controlling for poverty status, sex, and race/ethnicity, except for Black adolescents [2]. Rural areas typically have the highest rates of HPV with few patients asking their provider about the vaccination or completing the series [3]. Disparities in rural areas are common and consistently lead to higher rates of cancer from HPV [4].

Current literature on the barriers and facilitators to HPV vaccination uptake nationwide cite [5–8] lack of knowledge and awareness, and safety concerns as barriers to vaccine uptake [5–9]. Patient demographics can impact vaccine uptake as well; male patients of Hispanic background are more likely to have the HPV vaccination series initiated [10]. Additionally, cultural factors including vaccine hesitancy and personal beliefs, namely not thinking often about the vaccine, further negatively impact HPV vaccination [11].

Rural US areas face additional healthcare access challenges. Patients in rural areas face provider shortages, geographic dispersion, and cost issues due to lower income and insurance [12]. Patients with HPV-related cancer may not receive the highest quality of care due to lack of provider access, transportation, geography, and finances [13]. Barriers to rural care for HPV may be addressed by expanding government coverage, creating/strengthening partnerships with rural community pharmacies and physicians, and addressing local gaps to care [13].

One proposed solution to increasing HPV vaccination rates has been to expand accessibility by increasing pharmacist-administered HPV vaccines. The Public Readiness and Emergency Preparedness (PREP) Act gave pharmacists the ability to order and administer childhood vaccinations in the pharmacy setting without a prescription [14]. With the PREP Act slated to expire on Dec. 31, 2024, pharmacists will lose federal coverage for providing childhood vaccinations [15]. Since the passing of the PREP Act, only eight US states have rebuked pharmacists from administering vaccinations on the CDC recommended immunization schedule for children ages 7–18. Thirty-five states allow all recommended childhood vaccinations to be administered, five allow for the vaccinations to be administered with additional age restrictions, and three do not allow for vaccinations to be administered [16]. States have begun preparing for the PREP Act expiration. South Carolina has introduced legislation on the statewide level to permanently expand pharmacist scope of practice to include childhood vaccinations [17]. HPV vaccination is a childhood vaccination on the CDC-recommended vaccination schedule, allowing pharmacists in the majority of the US to administer this vaccine as a result of the PREP Act and subsequent policies [18].

Community pharmacies are essential access points for basic healthcare, with the majority of Americans living within five miles of one [19]. Patients in rural areas of the US say distance to providers, long wait times, and closures of clinics and hospitals are barriers when seeking healthcare [20]. In addition to close proximity to most Americans, pharmacists are considered one of the most trusted occupations in the United States; making pharmacists able to implement an effective and simple HPV vaccination program in their respective practices [21]. The aims of this study were to identify specific barriers and facilitators to HPV vaccination in the rural SC community pharmacy setting via qualitative interviews.

Methods

Design

This study used semi-structured qualitative interviews to identify barriers and facilitators to HPV vaccination in rural, SC community pharmacies. The primary author's Institutional Review Board approved this study as exempt from review.

Interview participants

Pharmacists practicing in rural, SC community pharmacies were interviewed. Pharmacies with a Rural–Urban Commuting Area [RUCA] code of four + were included in the study. Code 4 is "micropolitan area core: primary flow within an urban cluster of 10,000 to 49,999 (large UC)" [22]. These areas were considered for study due to the nature of rural areas and their potential lack of primary care physicians in the area who would normally administer childhood vaccinations. The pharmacies were limited to community pharmacies. Recruited pharmacists included pharmacists from pharmacies who did and did not currently offer the HPV vaccine in their practice

or keep it in stock. The list was then randomized. Pharmacies were contacted via phone and email for recruitment in the study. Pharmacists were invited to interview if they held a full-time position in their place of employment. An incentive of $20 per pharmacist was provided to participants.

Theoretical framework

The Consolidated Framework for Implementation Research [CFIR] is a conceptual framework consisting of five domains, inner setting, outer setting, intervention, individual, and process, and 39 constructs are associated with implementation [23]. CFIR was chosen due to its ability to the ability for the domains to be applied to studies in the community pharmacy setting, and prior consistent use of the framework in similar studies [24].

HPV vaccination is the evidence-based intervention of interest in this study. Implementation of HPV vaccination services by community pharmacists remains a challenge, especially in rural communities. CFIR allows for the identification of barriers and facilitators that will influence the implementation of HPV vaccination.

CFIR guided data analysis and interpretation, allowing for consistent identification of implementation determinants. The framework is extremely customizable, and the constructs were applicable the barriers and facilitators being discovered in the interviews. Using the CFIR allows for barriers and facilitators to be more clearly and universally named. AD was CFIR trained.

Data collection

Interviews were conducted by the primary author via telephone or Zoom. Each interview was approximately 30 min. A semi-structured interview guide was employed, with open-ended questions to facilitate discussion. The development of questions was informed by a literature review to examine HPV and HPV vaccination efforts in SC, specifically pharmacist led efforts. Interviews were conducted between August and December 2021 and were audio recorded. Audio recordings were transcribed using the Temi transcription service. Once transcribed, the documents were wiped of any identifying information about either the pharmacist or their pharmacy. Interviews concluded when the point of saturation was reached. The point of saturation is referred to in qualitative methodology as the moment in which collection of additional data is unnecessary [25]. Interview responses began to be repetitive, thus the point of saturation was deemed reached.

Data analysis

Transcripts were coded in NVivo 12 software. CFIR was used to guide deductive coding of the transcripts [23]. The interview guide was developed based on previous literature. Codes were used to maintain uniformity throughout the coding process. All transcripts were initially coded by the primary author, with a second coder independently coding 25% of the transcripts. Discrepancies were discussed. After coding, the scale of valence and strength for each construct was identified using the CFIR Rating Rules [26]. Strength ratings were either 1 or 2, with 1 being less influential and 2 being a strong influence. Constructs designated strong barriers were assigned a -2 rating. Strong facilitators were assigned a +2 rating. Some of the codes were given a ranking of 0 meaning the construct was decided to be neutral to the implementation. A rating of X was assigned to those constructs which had a mixed influence of positive and negative. Any construct in the CFIR framework not found in the interviews as a barrier or facilitator was labeled as n/a. To make determinations on ratings, the team met and discussed all coding. If there was a discrepancy on if a construct was a barrier/facilitator, the team discussed their perceptions of the data. The team then discussed how strong/weak the mentioned construct appeared in the coded data.

Results

A total of 10 interviews were conducted. Of the 39 CFIR constructs, 14 were found in the interviews as being either a barrier, facilitator, or both to HPV vaccination programs in community pharmacies. Key barriers and facilitators from each of the domains are depicted in Fig. 1. Barriers and facilitators were identified within each of the five CFIR domains including inner setting, outer setting, innovation characteristics, process, and characteristics of individuals. The constructs identified as barriers (negative or mixed summary rating) included: implementation climate: relative priority, readiness for implementation: available resources, readiness for implementation: access to knowledge and information, external policy, cost, design quality and packaging, engaging innovation participants, executing, and knowledge & beliefs about the innovation. Facilitator constructs (positive or mixed summary rating) included implementation climate: relative priority, implementation climate: learning climate, cosmopolitanism, patient needs & resources, evidence strength & quality, agents/champions/key stakeholders, and knowledge & beliefs about the innovation.

Table 1 displays the summary rating including strength and valence ranking of the discovered constructs. Design quality & packaging, cost, available resources, external policy & incentives, and innovation participants were found to be the strongest barriers to HPV vaccination

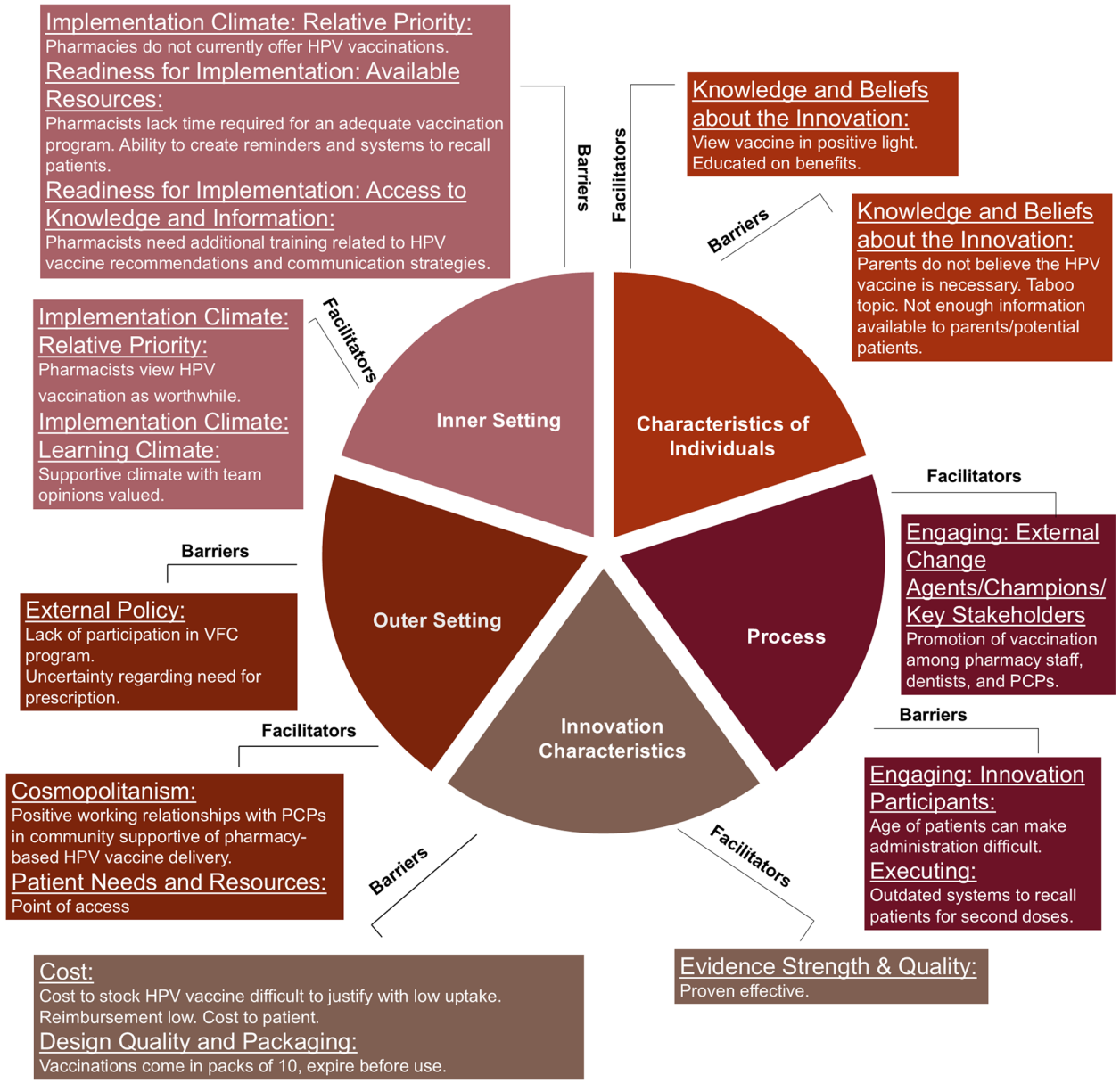

Fig. 1 CFIR Informed Barriers and Facilitators

programs in rural pharmacies. The strongest facilitators were patient needs & resources and cosmopolitanism.

Table 2 displays example quotes of the reasons pharmacists had for mentioning a construct as a barrier or a facilitator. Design quality and packaging were found to be a barrier due to the inability to purchase single doses of the HPV vaccine. Doses are only available for purchase in large packs of ten, making rural pharmacies less likely to have the vaccine in stock. Pharmacists expressed a need for smaller packs for purchase so that pharmacies lower their risk for profit loss. The cost was described as a barrier in multiple contexts. Pharmacists stated that both the cost of the vaccination on their end and the cost of receiving the vaccine on the patient's end provided obstacles to administering more doses. Pharmacists were concerned with the low rates of reimbursement for the HPV vaccine. Available resources were shown to be a barrier as pharmacists explained that outdated systems and processes, such as second dose recall, prevent them from pushing patients to request the HPV vaccine. External policies including the lack of programs reimbursing pharmacists for administering the vaccine, and

Table 1 Consolidated Framework for Implementation Research Summary Ratings

Domain	Construct	Summary Rating[a]
Innovation Characteristics	A. Evidence Strength & Quality	+1
	B. Relative Advantage	0
	C. Adaptability	n/a
	D. Trialability	n/a
	E. Complexity	n/a
	F. Design Quality & Packaging	**-2**
	G. Cost	**-2**
Inner Setting	A. Structural Characteristics	0
	B. Networks & Communications	n/a
	C. Culture	n/a
	D. Implementation Climate	
	1. Tension for Change	n/a
	2. Compatibility	n/a
	3. Relative Priority	X
	4. Organizational Incentives & Rewards	n/a
	5. Goals & Feedback	n/a
	6. Learning Climate	+1
	E. Readiness for Implementation	
	1. Leadership Engagement	n/a
	2. Available Resources	**-2**
	3. Access to Knowledge & Information	-1
Outer Setting	**A. Patient Needs & Resources**	**+2**
	B. Cosmopolitanism	**+2**
	C. Peer Pressure	n/a
	D. External Policy & Incentives	**-2**
Characteristics of Individuals	A. Knowledge & Beliefs about the Innovation	X
	B. Self-Efficacy	n/a
	C. Individual Stage of Change	n/a
	D. Individual Identification with Organization	n/a
	E. Other Personal Attributes	0
Process	A. Planning	n/a
	B. Engaging	
	1. Opinion Leaders	n/a
	2. Formally Appointed Internal Implementation Leaders	n/a
	3. Champions	+1
	4. External Change Agents	+1
	5. Key Stakeholders	+1
	6. Innovation Participants	**-2**
	C. Executing	-1
	D. Reflecting & Evaluating	n/a

[a] Summary ratings range from -2 to 2 where 2 represents 'strong', 1 represents 'weak', 0 represents neutral and X represents mixed. Negative influence means the construct hinders implementation, while positive means the construct facilitates implementation. *n/a* Not mentioned during interviews

the requirement for a prescription from a primary care provider after the PREP Act, were also mentioned as barriers. Engaging innovation participants showed to be a perceived barrier as pharmacists mentioned the possible stigma around the HPV vaccine. Pharmacists report perceiving conversations about the HPV vaccine as difficult and controversial due to parents' perceptions of the vaccine, particularly in rural communities. This leads to a recommendation in order to maintain relationships in their community, critical to a small business owner.

Table 2 Representative quotes[a]

Construct	Excerpt from interviews
Design Quality & Packaging	"Unfortunately it's not really, uh, practical. I just, I, I have had zero prescriptions sent for it and zero patients request it. So, uh, I, there would be no way I could justify ordering mean. I think it's that some vaccines, you know, they, they have a, a single dose, you can just order one dose at a time, but most of 'em including the HPV, you, you have a minimum of 10 doses, so, uh, there's just not enough demand for it where I'm at, unfortunately."
Cost	"So again, I think it would be a cost issue for me. I just, while we were talking, I just looked up how much, um, the HPV vaccine actually costs us and it's, you know, upwards of $2,400 for 10 pre-filled syringes. So that would be a barrier for me." "Well, we have it, we have all the vaccinations and we've had it before, but in South Carolina, as you are aware, if it costs more than $10, you leave out 90% of the population."
Available resources	"We really don't have great software. It's a really cheap software provider. So we don't have really fancy, uh, like second dose reminders, but, you know, having to do Shingrix, which is a two dose vaccine and the COVID vaccines, I kind of developed a system. I just run reports and I track who got their second dose and who hasn't and, then I just go down the list one at a time. I really don't have a lot of help, you know, with the vaccines that I do at my store. We, we have a lot of older technicians, like 45 and older, and they're real resistant to change and used to the way things were."
Patient Needs & Resources	"I certainly think the, the community would benefit, anything that we can do, any service that, that we can provide, otherwise the patient would have to travel like 30 miles."
Cosmopolitanism	"We do have relationships with, I guess, stronger relationships with a lot of the providers in the area that would be definitely facilitate, you know, us providing the vaccinations."
External Policy & Incentives	"It's well, it's a little more difficult normally with it via in adolescence because pharmacists have to have a prescription order for anybody under 18 for that vaccine. Well, right now we're in the prep act. So any childhood vaccine is kind of covered under the prep act we can give, but that will be expiring at some point as COVID goes away." "I think we would pursue further free vaccines from the state to provide, any programs that are available in that regard."
Engaging Innovation Participants	"But parents, you know, maybe not wanting their kids to get the vaccine because it thinks it's like a green light for 'em to go, you know, be promiscuous or whatever." "I mean, I had one child in here last year. I mean, her dad basically held her down for me to give her the shot. And, and I felt like saying I wanted to ask him, you know, leave the room and let me work with her."

[a] Representative quotes are included for constructs with strength of ± 2 (Table 1)

Only two constructs were identified as strong barriers (+2 rating). Cosmopolitanism, the degree to which the organization had a relationship with external organizations [27], was one of the strongest perceived facilitators. Pharmacists and pharmacies that had a strong relationship with primary care physicians or pediatricians in the area tended to have a more robust vaccination program in their pharmacies. Recommendations from primary care physicians to pharmacies gave pharmacists a steady stream of patients and lowered the risk of profit loss due to unused vaccinations. Patient needs and resources were facilitators due to the pharmacist's belief that the community would benefit from HPV vaccination. As HPV vaccination can prevent HPV related cancers, pharmacists see HPV vaccination as beneficial from a patient perspective.

Multiple other constructs were found as facilitators of lesser strength: evidence strength & quality, learning climate, and engaging champions, external change agents, and key stakeholders.

Discussion

Rural communities face disproportionate rates of HPV-associated cancers and have significantly lower HPV vaccination uptake. Community pharmacists can address barriers to HPV vaccination due to their location within rural communities, additional time-saving attributes, and trust in community members. However, barriers in rural community pharmacies exist. This study identified the strongest perceived barriers and facilitators to community pharmacy HPV vaccination programs, which is important to understand how to conduct these initiatives.

Multiple barriers, such as cost and external policy, could be grouped to be addressed. Government programs, such as Vaccines for Children [VFC], provide the vaccine free of charge to be administered to uninsured or underinsured individuals under age 18 [28].

Pharmaceutical companies may want to market smaller packages of the HPV vaccination. Making the vaccine only possible to purchase in large quantities prevents the company from selling more and preventing pharmacies from purchasing. Distributing quantites of 1–3 would allow pharmacies to keep a small stock on hand without risking losing money if most of the pack of 10 does not sell. In addition to addressing the cost to patients, pharmacy enrollment in the VFC program could address the cost-related barriers pharmacies face in stocking the vaccine.

Increasing pharmacist awareness and utilization of the comprehensive state vaccination registry could further increase vaccination rates. SIMON, the SC Immunization Registry, has the capabilities to address this however,

more needs to be done to increase awareness of the program amongst pharmacists. Pharmacists were concerned that outdated second dose recall systems could be a potential barrier. If a comprehensive recall system could be implemented in the community pharmacy, sending automatic text or email reminders for patients' second dose, the impact of human error could be lessened.

The perceived facilitators need to be exploited to encourage the formation of vaccination programs in pharmacies. Cosmopolitanism should be built into the foundation of pharmacies and primary care physicians' offices to work together to provide patients and business to both outlets. Primary care physicians can recommend pharmacies for patients to receive their HPV vaccinations, which is helpful for patients in rural communities needing a second dose. Pharmacies in rural areas are more accessible than physician offices, and physician reminders to patients and their parents that pharmacies provide vaccinations could increase vaccination rates. Rural area pharmacies could identify parents of children who need to visit a primary care physician for a well-visit, increasing the child's overall health.

Rural pharmacies have a higher touch point with patients than their primary care counterparts. Robust HPV vaccination programs could be implemented in these practices, with proper reimbursement and funding, HPV vaccination rates could increase. Increased rates of vaccination against HPV would lower disease prevalence throughout SC.

Limitations

There are limitations to this study. One limitation includes time constraints community pharmacists were working under due to the COVID-19 pandemic at the time of the interviews. With the demand for COVID-19 vaccination and testing, pharmacists may not have had the capability to elaborate on their ideas during the interviews due to a lack of time. This study included 10 community pharmacists in rural SC and may not be representative of rural SC as a whole or rural pharmacies in other states. Thematic analysis is coder-dependent and may result in subjective interpretations. However, a second coder was used to limit this concern.

Conclusions

The findings from this study highlight pharmacist-identified barriers and facilitators to HPV vaccination in rural pharmacies. Patients in rural communities have few vaccine destinations, community pharmacies being a critical access points in these areas. However, due to the high cost of stocking the HPV vaccine and inability to order smaller quantities that would meet the demand in rural communities, many pharmacies do not stock the HPV vaccine. Opportunities to obtain quantities that meet their needs are critical to allow pharmacies to reach their full potential as HPV vaccine access points in rural communities. Effective implementation strategies to address cost and additional identified barriers are needed to increase HPV vaccination uptake.

Abbreviations

CDC	Centers for Disease Control and Prevention
CFIR	Consolidated Framework for Implementation Research
CIN	Cervical intraepithelial neoplasia
COVID-19	Coronavirus disease 2019
HPV	Human papillomavirus
PREP	Public Readiness and Emergency Preparedness
RUCA	Rural urban commuting area
STI	Sexually transmitted infection

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Authors' contributions

Study design: AD. Consultation throughout study: TH, HB. Analysis and interpretation of the data: AD, TH. Critical revision of manuscript: AD, SBT, MG, TH, HB. All authors have approved the final manuscript for publication.

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Data availability

Due to the confidential and sensitive nature of the data, the data cannot be made available.

Declarations

Ethics approval and consent to participate

The study received approval from the University of South Carolina [USC] Institutional Review Board (Pro00107754). All participants were provided with informed consent for the study and the ability to remove themselves from the study at any point.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests with respect to all aspects of the study and its publication.

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