Vaccine: X 20 (2024) 100533

Contents lists available at ScienceDirect

Vaccine: X

journal homepage: www.elsevier.com/locate/jvacx

Contemporary provider perspectives on how to address HPV vaccine hesitancy in the US: A qualitative study

Anna L. Beavis [a,*], Mahima S. Krishnamoorthi [a], Sarah Adler [b], Laura G. Fleszar [b], Meghan B. Moran [c], Anne F. Rositch [b]

[a] Department of Gynecology and Obstetrics, Johns Hopkins School of Medicine, Baltimore, MD, USA
[b] Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA
[c] Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

A B S T R A C T

Introduction: Despite over 15 years of real-world data that supports the safety and efficacy of the human papillomavirus (HPV) vaccine, in the United States vaccine hesitancy persists. Many studies have focused on vaccine-hesitant parents, but fewer have examined provider perspectives on how to address HPV vaccine hesitancy.
Methods: Between July 2021-April 2022, we recruited providers in Maryland and the broader Mid-Atlantic region who practiced pediatrics, primary care, family medicine, or adolescent medicine and who provided outpatient care for children ages 10–17. Semi-structured virtual interviews focused on provider-reported strategies to address HPV vaccine-hesitant parents, as well as perceived barriers to successful vaccination and provider perspectives on specific interventions to address parental hesitancy. Audio recordings were transcribed and analyzed via a combination of deductive and inductive coding. Higher-level themes within the domains of strategies, barriers, and perspectives on specific proposed interventions were identified.
Results and discussion: A total of sixteen providers completed an interview. Within the domain of provider-reported strategies, the following themes emerged: 1) leveraging continuity of care and established parental trust, 2) supporting parental autonomy, 3) tailoring the approach to specific concerns of vaccine-hesitant parents, 4) normalizing the HPV vaccine, and 5) focusing on health prevention and cancer prevention. Barriers providers identified were: 1) limited time, 2) lack of common ground with parents, 3) parent–child decision discordance, 4) availability of misinformation, and 5) parental concerns such as safety and necessity. In the domain for proposed interventions, providers favored interventions that saved time or were not resource-intense, that did not single out the HPV vaccine as different, were patient friendly, and leveraged efficiency through the electronic medical record. The insights from this study can help inform the development of provider-acceptable and feasible tools and interventions to address parental HPV vaccine hesitancy.

Introduction

Despite the well-established efficacy of the human papillomavirus (HPV) vaccine, parental vaccine hesitancy has been a longstanding barrier to optimal vaccine uptake in the United States. While the percentage of adolescents who were up-to-date with the HPV vaccine series (i.e. had received 2 doses if initiated prior to age 15, or 3 doses if initiated after) increased from 54 % in 2019 to 59 % in 2021 immunization rates still fall far below national goal of 80 % vaccine series completion by 2030 [1,2]. An analysis of 2019 National-Immunization Survey-Teen data found that than half of parents of unvaccinated adolescents do not intend to vaccinate their child in the next year [3]. However, this statistic does not reflect the complex interaction that occurs between parents and adolescents in the decision to vaccinate, as some parents may engage in shared decision-making with their adolescent about immunization choices,decision to vaccinate, particularly with regards to the HPV vaccine. Moreover, vaccine hesitancy exists on a spectrum, and reasons for lack of vaccination vary along that spectrum, suggesting that a one-size-fits all approach will not be sufficient to address parental HPV vaccine hesitancy [4].

Reasons for HPV vaccine hesitancy change over time, and providers are on the front lines of addressing HPV vaccine hesitancy. While many studies have examined parental HPV vaccine hesitancy, fewer have explored providers' experiences with and perspectives on addressing this issue with parents. We therefore sought to explore providers' perspectives on engaging with HPV vaccine-hesitant parents through qualitative methods. Findings from this study provide insight on the challenges faced by providers, as well as their recommendations for best practices in addressing vaccine hesitancy in the contemporary era.

* Corresponding author at: 600 North Wolfe St, Phipps 281, Baltimore, MD 21211, USA.
E-mail address: Abeavis2@jhmi.edu (A.L. Beavis).

https://doi.org/10.1016/j.jvacx.2024.100533
Received 17 November 2023; Received in revised form 20 July 2024; Accepted 22 July 2024
Available online 24 July 2024

Methods

Setting, participants, and recruitment

All study procedures were approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board. Between July 2021 and April 2022, we recruited physicians practicing in pediatrics, primary care, family medicine, or adolescent medicine specialties who provided care for children ages 10–17 in Maryland and surrounding states. This Mid-Atlantic region represents a diverse population in terms of socio-economic status, urban-rurality, and racial and ethnic makeup.

Potential provider participants were emailed an invitation to participate in the study via several mechanisms between July 2021-November 2021. A detailed description of recruitment strategies can be found in Appendix 1. To summarize, invitations were sent via electronic mail to regional and local listservs of providers whose primary practice was in adolescent medicine, pediatrics, family practice, or general medicine. All providers who responded were invited to participate in a virtual interview with $100 compensation. Initially a 10–15-minute uncompensated survey was required prior to signing up for an interview, but due to poor response this requirement was ultimately removed. All participants provided electronic written consent and basic demographic information including their specialty and practice location.

Interview guide development and conduct

The interview guide was developed using the Social Ecological Model theoretical framework, which considers multi-level influences on vaccine decision-making, including interpersonal, organizational, community, and societal contexts [5]. The guide was designed to be similar and complementary to the questions asked in our prior qualitative study of HPV vaccine hesitant parents [6,7]. Discussion topics included the providers' experience recommending the HPV vaccine, their strategies and approaches towards vaccine hesitant parents, and perceived barriers to optimal vaccination amongst vaccine hesitant parents. We also specifically asked for their perspectives on distinct interventions/scenarios, including published interventions and interventions that were either favorably or poorly reviewed by vaccine hesitant parents in our earlier study [8–10]. The full interview guide is available in Appendix 2.

Interviews lasted 45–60 min and were conducted virtually via two-way audio-visual connection using the Zoom platform. Interviews were conducted by one member of the study team with training and experience in qualitative research; another member of the study team was present to take notes and provide technical support.

Data analysis

All interviews were recorded and transcribed using anonymous identifiers. One member of the study team (SA or LF) took notes during the interview. Two members of the study team (SA and MK) reviewed the interview transcripts and developed a draft of a codebook. Qualitative analysis was performed using open coding which included both deductive and inductive codes. Deductive codes were derived from the predefined questions and topics asked in the interview guide (e.g., the specific scenarios of research interest) and inductive codes were those derived from the participants' responses. To refine the code book, SA and MK applied the codes to three interviews and reviewed the coding schema with the entire study team. After an additional round of codebook revisions, SA and MK coded the transcripts using Dedoose 9.0.84. SA, MK, and AB reviewed and synthesized the results, and identified higher-level themes which were then summarized within three categories: 1) specific strategies the providers reported using to address vaccine hesitancy, 2) barriers providers identified to successfully recommending the vaccine to hesitant parents, and 3) provider perspectives on specific interventions they were queried about. An abbreviated codebook can be found in Appendix 3.

Results

A total of 16 physician providers were interviewed, of whom 12 were pediatricians and 4 practiced family medicine (Table 1). Eight reported working in urban areas, 7 reported working in suburban areas, and 1 reported working in a rural area. Two providers were still in residency; of the other providers, the majority had been in practice at least 5 years.

Strategies to address HPV vaccine-hesitant parents

All providers reported regularly interacting with vaccine-hesitant parents in their practice, but they all noted that the frequency with which they interacted with vaccine-hesitant parents had decreased since the vaccine's first approval, and that hesitant parents made up the minority of their patients. Providers described various strategies that they employed to overcome vaccine hesitancy and facilitate successful vaccination, synthesized within 5 themes (Table 2).

Strategy Theme 1: Leveraging continuity of care and established parental trust

Providers reported more confidence addressing HPV vaccine hesitancy in parents with whom they had a strong foundational and trusting relationship. Providers noted that they could point to their historically good relationship with a vaccine-hesitant parent and child as proof that they could be trusted to provide a safe and reliable recommendation. Additionally, providers felt that the established, trusting relationship supported open communication about vaccine hesitancy which further facilitated vaccination.

> "*…a little bit of trust in a provider saying like, Okay, I trust you. I know you're gonna do what's best for my child and then ultimately, just feeling like there's only mostly like benefit from [vaccination].*" – *Participant 7*

Additionally, some providers reported that continuity of care allowed them to "prep" the parents well in advance of the HPV vaccine recommendation. This strategy manifested for some as providing written information at an earlier visit, and for others reminding the parent about the upcoming vaccination and allowing them to bring concerns or questions to the next visit.

> "*So I may have mentioned it… when the kids were nine to kind of prep them, prep the parents that I recommend [HPV vaccination] across the board.*" – *Participant 12*

Strategy Theme 2: Supporting parental autonomy and sense of control

Many providers described successful approaches that served to give parents a sense of control over the vaccine decision-making process. They emphasized that actively including parents in the decision-making process for their child's healthcare can be critical to facilitate

Table 1
Demographic characteristics of the physicians included in qualitative interviews.

	N=16
Specialty	
Pediatrics	12 (75.0 %)
Family Medicine	3 (18.8 %)
Primary Care	1 (6.3 %)
Practice Area	
Urban	8 (50.0 %)
Suburban	7 (43.8 %)
Rural	1 (6.3 %)
Years of Practice	
In residency	2 (12.5 %)
Less than 5 years	1 (6.3 %)
5–10 years	3 (18.8 %)
10–15 years	4 (25.0 %)
More than 15 years	6 (37.5 %)

Table 2
Themes within provider-reported strategies and the practical approaches they described.

Strategy Theme	Specific Approaches
1. Leveraging continuity of care and established parental trust	• Point to historically good relationship as proof of reliable recommendation • "Prep" parent with verbal or written information ahead of vaccine visit • Encourage parents to bring questions or concerns to upcoming visit(s)
2. Supporting parental autonomy and sense of control	• Ask permission to discuss the vaccine • Allow parents to influence timing of vaccination
3. Tailoring the approach to the vaccine-hesitant parent	• Consider use of anecdote and less scientific messaging • Share personal experience with HPV vaccine • Provide a variety of written information resources
4. Normalizing the HPV vaccine	• Present the HPV vaccine in the same way as other vaccines • "Couple" the vaccine recommendation with other vaccines • Use presumptive recommendation technique
5. Focusing on health prevention and early cancer protection	• Highlight genital warts prevention, especially in boys • Focus on cancer prevention effects

constructive conversations with vaccine-hesitant parents. One provider reported they "ask them for permission is it okay that we talk about this next time?" (Participant 8) which helps parents feel included in the decision to vaccinate.

> *"…Some of it* [vaccine hesitancy] *might just be control, that parents want some element of control over the vaccine situation". – Participant 11*

Specifically, several providers described giving parents control over the *timing* of the vaccination. This approach was reported to be particularly useful in addressing parental concerns about the number of vaccinations given at the 11–12 year old visit.

> "*I think for a lot of people just having some say in how the vaccine is given, or, you know what the timing of it is. I think that gives them some ownership of it, and pushes somebody who's a little hesitant over*…" – *Participant 2*
> "And so we've actually just recently made a switch to offering it the 9 and 10 year old checkup so that you get one at 9 [years old], one at 10 and two at 11 as opposed to lumping them all in together. Because …one of the big reasons we see a delay sometimes it's just by a year where they say oh, we'll start that next year because you know, that's too many [vaccinations] for today." – Participant 9

Strategy Theme 3: Tailoring the approach to the vaccine-hesitant parent

Providers discussed several ways in which they changed or adapted their approach to the vaccine-hesitant parent to address hesitancy. For example, while almost all reported using standard written resources such as the HPV Vaccine Information Sheet and the CDC government website, one provider described *"print[ing] out academic articles about the HPV vaccine for parents of certain academically inclined families"* (Participant 15).

Some found that using emotional arguments, anecdotes, or their "own personal experiences," (Participant 17) were more effective with certain parents, rather than relying on statistics and numbers.

> "*We as providers, we tend to talk statistics and economics. But …anecdotes of parents who refused immunizations or horrible things that happened to their kids…I think the power of the anecdote is useful.*" – *Participant 13*
> "*I do think the more I do this, I realized the scientific explanations don't work very well and you know… more sharing from the heart and trying to get people's emotions in a non-manipulative way is what works.*" – *Participant 11*

Along this same vein, many providers did report sharing their own personal vaccine practices with their patients to leverage trust and overcome hesitancy. Several noted that hesitant parents often specifically ask providers if their own children have been vaccinated against HPV.

> *"I think is a powerful message to say that I stand behind it with my own family, that I wouldn't recommend something that I wouldn't do myself." – Participant 3*

Strategy Theme 4: Normalizing the HPV vaccine

Providers emphasized the importance of treating the HPV vaccine as part of standard medical care, and not singling it out as different. One provider noted that they "don't give any [extra] information about the tetanus shot before a 2-month visit" (Participant 16) and therefore do not give information about the HPV vaccine ahead of the visit. Providers also emphasized that the lack of school requirement automatically signals that the vaccine is different from others, and that using techniques that normalize the vaccine help overcome this.

> "*I feel like my way I approach this vaccine is to try to make it seem no different than anything else." – Participant 14*

One approach providers described was to 'couple' or 'sandwich' the vaccine with other less-controversial vaccines in order to indirectly demonstrate that the HPV vaccine is the same as any other.

> "*The sandwich. You're getting TDAP and HPV today, you have any questions about that?" – Participant 10*

Many providers reported using the presumptive method of recommendation – an evidence-based communication strategy that has been shown to help improve HPV vaccination rates [11]. For example, one provider reported saying *"your child is due for this vaccine and is going to get the first dose today" (Participant 13)* and often met minimal resistance by parents. Some providers noted that they prefer this presumptive method because it still allows parents who do have questions or concerns the opportunity to ask them, but only after the physician has *"recommended with the assumption that they're getting it today". (Participant 1)*.

> *"I frame it as like "you're due for these vaccines" as opposed to "Hey, do you want this"" – Participant 8*
> *"I just list like "you're due for this today"…… There's no like option listed. And for most people that just rolls in and they're fine." – Participant 14*

Strategy Theme 5: Focusing on health prevention and early cancer protection

Providers reported emphasizing the vaccine's protective effect against cancer and genital warts to introduce the vaccine and minimize parental opposition. Some providers discussed how adapting vaccination counseling to children often required focusing on genital warts, while counseling towards parents often included cervical, oropharyngeal, anal, and penile cancer prevention. Additionally, multiple providers described how they might use sex-specific tactics with regards to health benefits. Specifically, they described discussing cancer prevention with girls and genital wart prevention with both boys and girls, with some providers noting that genital warts were a particularly compelling

talking point in boys.

> *"I think I make the cancer push a little bit stronger [in girls]…. with the information about oropharyngeal related cancers, I think I maybe could push that a little bit more in boys. But yeah, normally talking about genital warts is enough to get most boys on board."* – *Participant 11*

Barriers to addressing HPV vaccine hesitancy

When providers discussed how they approach vaccine-hesitant parents, we identified barriers to employing the above strategies and addressing hesitancy generally, synthesized into the themes below.

Barrier Theme 1: Limited time

A persistent barrier identified was that limited time threatened the ability to make a successful vaccine recommendation. This manifested both in terms of short-duration clinic visits, and in terms of not having enough longitudinal time with parents to develop a trusting relationship. For example, while providers found providing parent/patient-specific materials beneficial (Strategy Theme 3), they also reported that it often it required too much time to review the materials and any materials the family may have brought. *"I think, you know, the hard part about primary care is there's a lot to cover." – Participant 9.* While leveraging the long-term relationship with the patient (Strategy Theme 1) may be helpful, providers reported needing repeated visits to cover comprehensive information and address the extent of the parents' hesitancy concerns.

> *"And like showing through how you care and the relationship that like your information means more than what they're getting on the internet, but I think that takes a lot of time." – Participant 16*

The lack of a long-standing and trusting relationship developed over time may diminish a parent's trust in the provider's recommendation.

> *"If they haven't seen me that often, there's still that element of… not knowing …my policies and education and they just don't trust me as much." – Participant 2*

Barrier Theme 2: Lack of common ground with parents

Many providers described difficulty addressing vaccine hesitancy particularly in parents whose values, and particularly religious values, were not concordant with their own. They reported this made it difficult for them to develop open communication lines with the parents.

> "*…for people who have dealt deeply held religious or political beliefs about the vaccine…I think that's the group that I had the hardest time connecting with and having productive conversations with*" – *Participant 11.*

Other providers noted that with many religious patients, the physician is often not the most trusted source of information, as opposed to clergy or other leaders in their religious institutions. Providers reported feeling somewhat ineffective compared to the effect of community leaders.

> *"… that can be a really challenging discussion, I think they still want to see clergy because they feel that I'm biased as a doctor." – Participant 3*

Barrier Theme 3: Parent-child discordance

Providers reported that some parents may choose to wait to vaccinate until their child is at an age where they can make the choice for themselves, allowing the child to have more autonomy in their own healthcare decisions. However, providers found it difficult to approach the dyad when the parents and the patient had differing opinions regarding the vaccine.

> "*The other thing I think I really struggle with is families where the parents say no, and the kid wants it anyway… if the parents sitting right there and the kid is 11, like, I'm not going to be like, we're doing it anyway.*" – *Participant 11*

Providers expressed discomfort with situations where the parent asks a young child to make the decision, asking, "what kid is going to want to a vaccine or shot, really?" (Participant 8). Providers recognized that parents are providing their child with the opportunity to have autonomy over their care, but it can be difficult to navigate these conversations.

> "*I mean, it usually is the parents making the decision, but sometimes they will turn to the kid and say "Well what do you think?" which I don't know, for 12 year-olds is a little weird." – Participant 2*
>
> *"Sometimes parents will ask the kid if they want it. I'm always like cringing inside." – Participant 8*

Barrier Theme 4: Availability of misinformation

Providers emphasized that misinformation from a variety of sources, including the internet, social media, friends and family, heavily influence parental vaccine hesitancy. Providers described instances of parents conveying vaccine anecdotes from friends and family or posts from social media as common occurrences when discussing side effects and safety. As noted in Strategy Theme 3, anecdotes can hold great power for or against vaccine recommendation.

> *"it's the hearsay, it's what they hear from like someone 10 degrees away from them – 'someone grew an arm, someone lost their legs, someone went paralyzed, someone went…' there's always something that you hear about, and somehow or another, it was correlated to the day that they got their HPV vaccine." – Participant 4*
>
> *"It's all internet related. I mean… there's a lot of just like misinformation out there." – Participant 16*

Barrier Theme 5: Provider-reported parental concerns

Providers reported on their perception of parental concerns that are barriers to successful vaccination. These can be characterized into three major subthemes: concerns about safety and side effects, concerns about necessity, and concerns regarding sexual activity. They cited safety concerns – including short-term and long-term side effects – as the largest barrier to successful vaccination of hesitant parent, sometimes stemming from the newness of the vaccine and other times from the perception that the child will not be at risk.

> *"…a fair number of people feel like it just hasn't been around long enough. That it's too new and that we don't know enough about it. So there are concerns about potential dangers and side effects." – Participant 15*
>
> *"I think safety is a big thing…"do the risks outweigh the benefits?" sort of thing." – Participant 9*

Providers discussed that conversations about sexual health with the parent of a young child can be challenging, and often requires physicians to spend more time in the clinic (Barrier Theme 1). Also, providers stated that when parents found the conversation about sex and their child uncomfortable or awkward, this could motivate a delay in discussion of the vaccine until the child is older.

> *"Certainly, there's some people who say it goes against their values that their child is never going to have any sex partners other than somebody else who's never had any sex partners." – Participant 11*

Barrier theme 6: Impact of COVID-19 Pandemic

Many providers brought up how COVID-19 pandemic and vaccine has impacted HPV vaccine hesitancy in both positive and negative ways. Some discussed the logistical barrier of handling COVID-19 immunization alongside HPV immunization schedules. At the time of interview for

Table 3
Interventions/scenarios and provider perspectives.

Intervention	Provider perspectives	Exemplary quote(s)
Interventions prior to clinic visit		
Written assessment of vaccine hesitancy prior to the clinic visit	• Providers recognized potential benefit of understanding parents' perspective ahead of the visit • Most expressed concern at the potential negative impact of singling the HPV vaccine out as different from other vaccines • Providers noted the added time burden for both patients to complete and providers to review added paperwork	*"I think then they may come in a little bit more prepared as to why they're hesitant and we maybe could answer the questions better." – Participant 1* *"It's like one more thing for families to do. I feel like we ask them to do like a ton of stuff…. I feel like when there's so much though, there's so much noise, everything gets lost." – Participant 14*
Providing parents with HPV vaccine information ahead of the visit	• Providers felt providing information beforehand could be helpful, and that many already give Vaccine Information Sheets prior to the visit in which the vaccine will be administered • Providers cautioned against singling out the HPV vaccine by sending pre-visit information to parents	*"…for them to have something to rely on to say like, here's the actual data, I think that would actually be very appreciated to a lot of my patient population. A lot of those parents who really like to like to have that data." –- participant 9* *"So maybe singling out HPV isn't always the most helpful thing." – participant 10*
List of questions for the parents to discuss with providers given prior to clinic visit	• Providers expressed continued concern at singling out the HPV vaccine • Providers felt that this may be helpful for parents who don't know where to begin, but that most hesitant parents are already aware of their concerns are • Providers were concerned with the list of questions presuming a sense of uncertainty about the HPV vaccine before parents even meet with providers about it	*"I think you would have to be a little careful if you were only going to put a list of questions that they didn't make people think that these were other things that they should be worrying about. And we would need to make sure that providers had really good answers to those questions…I think [the list of questions] makes people think that there's something special about this one vaccine that they should be more worried about it." – Participant 10*
Interventions within the clinic space		
Vaccine navigator to ensure patients initiate, complete their vaccine series	• Providers recognized the potential benefit, especially given the efficacy of similar interventions for the COVID-19 vaccine • Overwhelmingly providers cited limited staff, time, and financial resources as barriers to implementation	*"That it's like not cost neutral, right like you pay a salary and you don't generate revenue" – Participant 7* *"…it would require person power to implement" – Participant 13*
Interactive decision aid to be used with parents during the clinic visit	• Providers recognized the potential for a decision-aid to facilitate discussions with hesitant parents, but not with parents who were already planning to vaccinate • Providers expressed concerns about the amount of time it would take to use the aid in clinic	*"if you're using kind of an interactive sort of guide to answer some of those questions would be how long it takes and how much of kind of the discussion at pulls from other areas at a time where everybody's a little bit short staffed" – Participant 9* *"I'm not sure that would be a great use of time for all parents that my friends, most of our parents are actually completely on board. – Participant 11*
Immunization Only Visits	• Many providers already use this strategy for other vaccines, and some providers reported using it for the HPV vaccine • This strategy was favorably viewed for repeat doses of the HPV vaccine, but many providers felt the initiation of the HPV vaccine was best done at a clinician visit	*"Immunization visits are kind of nice…I mean it's very frequent for us to say "okay, we'll have a nurse only visit scheduled at the right intervals. Okay, come back at the later time… get the next vaccine of the series. – Participant 3* *"We'll put an order in to make a shot only visit in two months. And at that point, since they already have the first one we don't need…to go through the same kind of thing that we do for the first one." – Participant 2*
Provider discussion guide to help assist them in conversations with hesitant parents	• Providers were open to learning about any new strategies they could implement in their discussion with patients, but preferred shorter documents with tips and tricks vs. a longer training course • Providers recommended incorporating these interventions into standing meetings so as to limit additions onto their schedules	*"I'm always up for learning more if there's some other news strategy or something, if there's some kind of tips and tricks or something. I'd be happy to read that over and incorporate it into my own personal spiel" – participant 12* *"I think it could be incorporated into like a grand rounds. Like just you know, how to talk to patients about or how to deal with vaccine hesitancy or how to talk to vaccine-hesitant parents." – Participant 5*
Interventions with other sources of information about the HPV vaccine		
Providing parents with information about surrounding community vaccination practices	• Providers had mixed opinions on providing information on the community's vaccination attitudes • Providers expressed concern about re-enforcing lack of vaccination in areas with low vaccination rates • However, many saw the utility of having up-to-date data readily available on the HPV vaccination rates in their state, county, and neighborhood/zip code for parents that might be receptive to that	*"I think that if families realize that most people do vaccinate their kids against certain things, they might feel more, you know, like, this is the right thing to do, and feel more confident in that decision." – participant 17* *"That would be helpful in my area where people are largely doing it, but maybe not so helpful in areas where most of the parents are hesitant to see like… it kind of reinforces that" – participant 9*
Resources with in-depth information about the vaccine	• Providers viewed in-depth information that was patient-friendly as a favorable adjunct to their practice • Providers recommended including information on safety, side effects, health benefit and importance, fertility effects • Providers emphasized understanding patient literacy-level and making the information factual but also engaging and patient-friendly	*"…having a handout, like an easy-to-read handout, potentially with graphs and like visuals and things… the right handout answering the right questions of like, you know, the top concerns that parents have across the board……I think would be good." –- participant 9* *"It's tricky with each community because you have to know our demographics really well, you have to know our literacy rate, you need to know our belief system, you have to know all of it well" – participant 4*
Online parental discussion forum	• Many pediatric clinics have existing patient or family advisory councils and providers were open to online forums hosted by those interest groups to discuss vaccine hesitancy via peer-to-peer learning • Providers cited barriers to implementation: lack of available trusted reliable source to moderate; time intensity, logistical hurdles of maintaining forum as lack of availability of trusted, reliable source to moderate the forum	*"I don't think that we'd have the capacity to be like running like that and potentially moderating it or whatever online groups" – participant 5* *"I don't know how we could necessarily host that in a non-biased way. … I think presenting it is unless it's really presented in an unbiased way diminishes the whole point of what we tell patients, which is "don't find stuff on the internet"." – participant 16*

(*continued on next page*)

Table 3 (*continued*)

Intervention	Provider perspectives	Exemplary quote(s)
Celebrity advocate for the vaccine	• Providers felt a celebrity who is a strong proponent of the HPV vaccine would be persuasive to parents • Providers highlighted the power of the anecdote in appealing to emotions to help people make the decision to vaccinate their child	*"Influential people speak volumes right so when Angelina Jolie tested positive for BRCA and got a mastectomy bilateral everyone was like, "oh, we all need bilateral mastectomies,"… When Chadwick Boseman died of colon cancer, all of a sudden everyone's calling in and saying "I need a colonoscopy". – Participant 4*

most providers, the standing recommendation was to avoid having any other vaccine within 2–4 weeks of the COVID vaccine, leading providers and parents to have to decide between the COVID-19 vaccine and the HPV vaccine. Additionally, providers noted that the broader conversation surrounding the COVID-19 vaccine may have *"resulted in some hesitancy around any vaccine sadly"* (Participant 6). One provider said:

> *"we're going to have a little problem with regular vaccines being lumped in with COVID in the population of people that are never going to get the COVID vaccine" – Participant 1.*

In contrast, the increased awareness of the vaccine reportedly made it easier to have conversations about specific details of the HPV vaccine including safety, efficacy, and side effects. Providers felt that patients and parents have become much *"more savvy about vaccines… there's a better understanding of what it means to have a vaccine preventable disease"* (Participant 6). Providers noted that, specifically, parents seemed more tolerant of post-vaccine side effects and that *"sometimes you don't feel good after vaccines and that that's how they work and that's okay."* (Participant 11).

Provider perspectives on specific interventions

Providers' perspectives on specific individual interventions with exemplary quotes are listed in Table 3. On analysis of their opinions regarding the interventions, four salient themes emerged.

Interventions Theme 1: The importance of limiting time and resource-intensity of the intervention

Providers expressed concern about any potential intervention where additional time or resource strain would be placed on providers, patients, or clinic staff. For example, while many saw the potential benefit of a vaccine navigator in their clinic, most expressed doubt as to the logistics of integration into the clinic and being able to financially support and sustain that person. Similarly, tools such as an interactive decision-aid or the list of questions parents could review with the provider were met with apprehension due to their time-intensity. The idea of hosting an online forum for parents was generally felt to be far too resource-intensive and was not considered feasible.

Interventions that saved time were viewed favorably. For example, immunization-only visits were often reportedly already used because they avoid another time-intensive physician visit. However, typically this was reported only in the context of repeat vaccinations, and not initiation of the vaccine series. Additionally, a campaign involving a celebrity advocate was viewed favorably as the parent would have exposure to this outside of the clinic visit, which could potentially reduce hesitancy prior to the visit, thus limiting time constraints. Providers were interested in the concept of a discussion guide that could help them frame conversations with vaccine-hesitant parents, but suggested that this content be delivered in time-neutral ways such as through already-existent Grand Rounds conferences.

Interventions Theme 2: The importance of normalizing the HPV vaccine

Providers cautioned against interventions that singled out or treated the HPV vaccine differently from other vaccines. For example, while the idea of a pre-visit "hesitancy assessment" could help providers better understand their parents/patients viewpoints ahead of the visit, providers cited concerns that it could draw specific attention to the HPV vaccine and counterproductively spark hesitation. Similarly, providing written or other information or a list of potential questions for parents to ask about the HPV vaccine ahead of the visit (but not other vaccines) was also viewed with caution for the same reason. In contrast, the concept of a celebrity advocate promoting the importance of the vaccine was viewed as positive as it could help normalize the vaccine to the public.

Interventions Theme 3: Ensuring the resources are patient-friendly

Providers frequently mentioned that the CDC Vaccine Immunization Sheets have limited utility due to their scientific presentation of the data, and lack of engaging visuals and information. Many providers describe having limited resources for parents that are specific to their population. They supported tailoring various interventions such as in-depth information sheets and other written resources to the patients. One provider specifically noted that being both at the appropriate literacy level but also culturally competent was important.

Interventions Theme 4: Leveraging the electronic medical record (EMR) and telehealth

In virtually all of discussions of interventions, the possibility of leveraging the EMR or telehealth to improve efficiency was brought up. Even though providers were hesitant to provide additional information ahead of the visit as they did not want to single the vaccine out (Intervention Perspective Theme 2), they did suggest using the online patient portal as a platform for some of these interventions could minimize time interruptions, while also being relatively low resource-intensive.

> *"MyChart [online patient platform] I think is a really good way that we've been able to communicate with patients ahead of time about stuff." – participant 8.*

Discussion

This study provides a rich source of data on the perspectives that providers have towards addressing HPV vaccine hesitancy, including strategies they engage in, barriers they encounter, and their thoughts on various interventions. Providers frequently utilized strategies that leveraged long-term relationships and rapport, as well as those that gave parents a sense of power and control over the vaccination process. Salient barriers included time constraints, the ready availability of misinformation, addressing discordance between the parent–child dyad, and combatting common parental concerns, such as safety and necessity. Providers also identified practical aspects of interventions that could make them more successful – namely, those that saved time, were patient-friendly, did not single the HPV vaccine out as different, and leveraged the EMR. The insights from these provider interviews could help inform future interventions to address HPV vaccine hesitancy. Specifically, the common underlying subtext throughout many of the providers' interviews was that a trusting provider-parent relationship could be a helpful adjunct to the implementation of any intervention to address HPV vaccine hesitancy. Future interventions that include a component of actively building parent-provider trust may be a successful way to reach the minority of parents who remain hesitant about the HPV vaccine.

In our prior study of vaccine-hesitant parents, we identified an overwhelming parental desire for straightforward information about the vaccine as well as a desire to feel in control of the vaccine decision-making process [7]. Providers in this study report strategies that are responsive to these parental needs. Like other provider-based studies, they expressed dissatisfaction with the standard informational written materials available for them to share with parents [12,13]. Lockhart et al found that clinic-specific customized HPV vaccine fact sheets that were visually pleasing, patient-friendly, and tailored to the specific patient population were viewed most favorably by parents and providers in a cluster-randomized multi-intervention pragmatic trial to increase HPV vaccine uptake. In fact, several parents reported that this influenced their decision to vaccinate [14]. The providers in our study suggest that information tools that are tailored to specific populations are an unmet gap in their resource arsenal to address HPV vaccine hesitancy. Information tools tailored to vaccine-hesitant parents' concerns are likely to be the most beneficial, and studies are needed to identify the impact of various tools that address parental needs along the spectrum of vaccine-hesitancy. This study and others suggest that anecdotes rather than scientific data and facts may be more effective for some vaccine-hesitant parents [15]. Providers noted that narratives from a "celebrity advocate" could impact HPV vaccine uptake, and cited celebrities who have successfully brought attention to other health issues. Tailoring the story to a specific vaccine-hesitant group could also be effective. For example, in a study of HPV vaccine messaging, Christian parents were more likely to intend to vaccinate their child if they were shown scripture-based metaphorical messaging about the HPV vaccine compared to the CDC Vaccine Information Sheet [16]. Future studies should evaluate the development and impact of tailored informational resources that are targeted towards specific populations with the highest levels of vaccine hesitancy.

Enhancing provider education on communication techniques that specifically address the spectrum of HPV vaccine-hesitant parent populations could also be beneficial. While providers in this study did report using evidence-based communication strategies such as the 'presumptive' or 'announcement' recommendation techniques, they also reported that they were not consistently effective in certain vaccine-hesitant parents. While motivational interviewing is a communication technique that has been suggested to employ after unsuccessful presumptive recommendation [17–19], it can be time-consuming – a common barrier cited by providers in this study. However, one provider did highlight how recommending the vaccine earlier, at age 9, can overcome some of these issues. Early recommendation allowed for additional time and an ongoing discussion over several visits, while still achieving successful "on-time" vaccination. Increasing evidence supports recommending the vaccine earlier to overcome many drivers of hesitancy, and further development of tools to support providers in this early recommendation is warranted [20]. Early and effective recommendation that results in at least one dose administered may be even more impactful, as the landscape of HPV immunization schedule is changing and some countries have moved towards a single-dose HPV vaccine schedule based on promising efficacy data [21].

The two most pervasive themes we identified with regards to the design of an HPV vaccine intervention were 1) to avoid singling out the HPV vaccine as different, and 2) to avoid anything time or resource intensive. So, while many studies have shown that parents are interested in being sent written or online information ahead of the visit, providers caution against this [12,14]. Similarly, while there may be utility in knowing the parental perspectives and hesitancy level ahead of the visit, providers expressed concern that administering a "hesitancy assessment" could counter-productively fuel more hesitancy. In contrast, other surveys and qualitative studies have found that providers see utility in these strategies and would consider employing them. Although some randomized controlled trials have found efficacy in strategies such as vaccine navigators or online training modules [22,23], providers interviewed in this study outlined clear barriers to long-term implementation of those types of approaches in their specific clinics and within their patient populations. Primary care providers also often face significant time and resource constraints in the clinic, and this can potentially limit their ability to deploy effective vaccine promotion interventions, such as vaccine navigators. Our study highlights these barriers, while identifying feasible solutions offered by physicians currently working under such constraints. Providers favored implementations that leveraged the efficiency and automation of the EMR. Automatic reminders, which have been shown to increase rates of HPV immunization in the general population, were already frequently used by providers in this study [10,24]. These perspectives are critical when considering the scalability and sustainability of an intervention to increase HPV vaccine uptake in the hesitant population.

Conclusion

Our study's strengths lie in the depth and breadth of information gleaned from these provider interviews. Additionally, we included a diverse group of providers that service urban, suburban, and rural areas. However, likely due to the nature of which providers agreed to complete the study, providers were generally strong proponents of the vaccine, and their perspectives may not be reflective of providers who are either not confident in their ability to recommend the vaccine, or who do not support vaccination. Additionally, while our interview group was a sufficiently large sample size to identify common themes, it was not large enough to allow for cross-comparison across race, gender, urban/rurality, or county. Given that the providers were all from the greater Maryland region, they wereunlikely representative of the entire United States physician population. Moreover, applicability of targeted interventional and educational programs may be less specific to other parts of the country. Future research in HPV vaccine hesitancy should focus on those populations with the lowest vaccination rates.

Our study provides key insights into providers' perspectives on engaging HPV vaccine-hesitant parents. Future studies which test interventions tailored to target vaccine-hesitant parents should include a component of improving or leveraging parent-provider trust, and should always assess provider perspectives and experiences with use. Interventions should integrate and leverage the EMR to improve efficiency while reducing burden on provider time and resources. Combined with the insights gained from our prior study of parental perspectives, this study helps inform parent- and provider-acceptable interventions to address HPV vaccine hesitancy. Vaccine hesitancy is an ongoing and dynamic barrier to optimal vaccine uptake and thus our interventions must adapt to the changing parental concerns and provider priorities in order to effectively increase vaccination rates.

Funding

This study was funded by an NIH/NCI supplement to the Sidney Kimmel Comprehensive Cancer Center (P30 CA006973-57S4) to Drs. Rositch and Beavis.

CRediT authorship contribution statement

Anna L. Beavis: Writing – review & editing, Writing – original draft, Supervision, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Mahima S. Krishnamoorthi:** Writing – review & editing, Writing – original draft, Formal analysis. **Sarah Adler:** Writing – review & editing, Investigation, Formal analysis, Data curation. **Laura G. Fleszar:** Writing – review & editing, Investigation, Formal analysis, Data curation. **Meghan B. Moran:** Writing – review & editing, Supervision, Formal analysis, Conceptualization. **Anne F. Rositch:** Writing – review & editing, Supervision, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Anne Rositch reports a relationship with Hologic Inc that includes: employment. A.F. Rositch is currently an employee of Hologic, which had no role in the current study, as it originated and was primarily conducted while she was an independent faculty researcher at Johns Hopkins University where she maintains an adjunct appointment.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jvacx.2024.100533.

References

[1] Walker TY, Elam-Evans LD, Yankey D, et al. Morbidity and Mortality Weekly Report National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13-17 Years-United States, 2018. https://www.cdc.gov/vaccines/imz-.

[2] Increase the proportion of adolescents who get recommended doses of the HPV vaccine — IID–08. National Immunization Survey - Teen (NIS-Teen). Published 2019. https://health.gov/healthypeople/objectives-and-data/data-sources-and-methods/data-sources/national-immunization-survey-teen-nis-teen.

[3] Sonawane K, Zhu Y, Montealegre JR, et al. Parental intent to initiate and complete the human papillomavirus vaccine series in the USA: a nationwide, cross-sectional survey. Lancet Public Health 2020;5(9):e484–92. https://doi.org/10.1016/S2468-2667(20)30139-0.

[4] Rositch AF, Liu T, Chao C, Moran M, Beavis AL. Levels of parental human papillomavirus vaccine hesitancy and their reasons for not intending to vaccinate: insights from the 2019 national immunization survey-teen. J Adolesc Health 2022;71(1):39–46. https://doi.org/10.1016/j.jadohealth.2022.01.223.

[5] Adjei Boakye E, Nair M, Abouelella DK, et al. Trends in reasons for human papillomavirus vaccine hesitancy: 2010–2020. Pediatrics 2023;151(6). https://doi.org/10.1542/peds.2022-060410.

[6] McLeroy K, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. Health Educ Q 1988;15(4):351–77.

[7] Beavis AL, Meek K, Moran MB, Fleszar L, Adler S, Rositch AF. Exploring HPV vaccine hesitant parents' perspectives on decision-making and motivators for vaccination. Vaccine X 2022:12. https://doi.org/10.1016/j.jvacx.2022.100231.

[8] Dixon BE, Zimet GD, Xiao S, et al. An Educational Intervention to Improve HPV Vaccination: A Cluster Randomized Trial. http://publications.aap.org/pediatrics/article-pdf/143/1/e20181457/1076161/peds_20181457.pdf.

[9] Dempsey AF, Pyrzanowski J, Campagna EJ, Lockhart S, O'Leary ST. Parent report of provider HPV vaccine communication strategies used during a randomized, controlled trial of a provider communication intervention. Vaccine 2019;37(10):1307–12. https://doi.org/10.1016/j.vaccine.2019.01.051.

[10] Gilkey MB, Parks MJ, Margolis MA, McRee AL, Terk JV. Implementing evidence-based strategies to improve HPV vaccine delivery. Pediatrics 2019;144(1). https://doi.org/10.1542/peds.2018-2500.

[11] Brewer NT, Kahn BZ, Kritikos KI, Heisler-MacKinnon JA, Young JD, Gilkey MB. How to make effective HPV vaccine recommendations starting at age 9. Hum Vaccin Immunother Published online 2023. https://doi.org/10.1080/21645515.2023.2216117.

[12] Cunningham-Erves J, Hull PC, Wilkins CH, et al. Healthcare providers' practice protocols, strategies, and needed tools to address parental HPV vaccine hesitancy: An exploratory study. Hum Vaccin Immunother 2022;18(6). https://doi.org/10.1080/21645515.2022.2136862.

[13] McRee AL, Gilkey MB, Dempsey AF. HPV vaccine hesitancy: findings from a statewide survey of health care providers. J Pediatr Health Care 2014;28(6):541–9. https://doi.org/10.1016/j.pedhc.2014.05.003.

[14] Lockhart S, Dempsey AF, Pyrzanowski J, O'Leary ST, Barnard JG. Provider and parent perspectives on enhanced communication tools for human papillomavirus vaccine-hesitant parents. Acad Pediatr 2018;18(7):776–82. https://doi.org/10.1016/j.acap.2018.05.012.

[15] Leader AE, Miller-Day M, Rey RT, Selvan P, Pezalla AE, Hecht ML. The impact of HPV vaccine narratives on social media: testing narrative engagement theory with a diverse sample of young adults. Prev Med Rep 2022:29. https://doi.org/10.1016/j.pmedr.2022.101920.

[16] Olagoke A, Hebert-Beirne J, Floyd B, Caskey R, Boyd A, Molina Y. The effectiveness of a religiously framed HPV vaccination message among Christian parents of unvaccinated adolescents in the United States. J Commun Healthc Published online 2023. https://doi.org/10.1080/17538068.2023.2171613.

[17] Frost H, Campbell P, Maxwell M, et al. Effectiveness of Motivational Interviewing on adult behaviour change in health and social care settings: A systematic review of reviews. PLoS One 2018;13(10). https://doi.org/10.1371/journal.pone.0204890.

[18] Cataldi JR, Fisher ME, Brewer SE, et al. Motivational interviewing for maternal Immunizations: Intervention development. Vaccine 2022;40(52):7604–12. https://doi.org/10.1016/j.vaccine.2022.10.091.

[19] Dempsey AF, Pyrznawoski J, Lockhart S, et al. Effect of a Health Care Professional Communication Training Intervention on Adolescent Human Papillomavirus Vaccination. JAMA Pediatr 2018;172(5):e180016.

[20] Saxena K, Kathe N, Sardana P, Yao L, Chen YT, Brewer NT. HPV vaccine initiation at 9 or 10 years of age and better series completion by age 13 among privately and publicly insured children in the US. Hum Vaccin Immunother 2023;19(1). https://doi.org/10.1080/21645515.2022.2161253.

[21] Mercuri M, Hackett K, Barnabas RV, Emerson CI. Evaluation of a single-dose HPV vaccine strategy for promoting vaccine, health, and gender equity. Lancet Infect Dis. Published online May 8, 2024. doi:10.1016/S1473-3099(24)00227-5.

[22] Berenson AB, Hirth JM, Kuo YF, Starkey JM, Rupp RE. Use of patient navigators to increase HPV vaccination rates in a pediatric clinical population. Prev Med Rep 2020:20. https://doi.org/10.1016/j.pmedr.2020.101194.

[23] Szilagyi PG, Humiston SG, Stephens-Shields AJ, et al. Effect of Training Pediatric Clinicians in Human Papillomavirus Communication Strategies on Human Papillomavirus Vaccination Rates: A Cluster Randomized Clinical Trial. JAMA Pediatr 2021;175(9):901–10. https://doi.org/10.1001/jamapediatrics.2021.0766.

[24] Martin S, Warner EL, Kirchhoff AC, Mooney R, Martel L, Kepka D. An Electronic Medical Record Alert Intervention to Improve HPV Vaccination Among Eligible Male College Students at a University Student Health Center. J Community Health 2018;43(4):756–60. https://doi.org/10.1007/s10900-018-0480-6.