

REVIEW

Provider communication about HPV vaccination: A systematic review

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ABSTRACT

Background. Improving HPV vaccination coverage in the US will require healthcare providers to recommend the vaccine more effectively. To inform quality improvement efforts, we systematically reviewed studies of provider communication about HPV vaccination. **Methods.** We searched MEDLINE, CINAHL, EMBASE, and POPLINE in August 2015 to identify studies of provider communication about HPV vaccination. **Results.** We identified 101 qualitative and quantitative studies. Providers less often recommended HPV vaccine if they were uncomfortable discussing sex, perceived parents as hesitant, or believed patients to be low risk. Patients less often received recommendations if they were younger, male, or from racial/ethnic minorities. Despite parents' preference for unambiguous recommendations, providers often sent mixed messages by failing to endorse HPV vaccine strongly, differentiating it from other vaccines, and presenting it as an "optional" vaccine that could be delayed. **Conclusion.** Interventions are needed to help providers deliver effective recommendations in the complex communication environment surrounding HPV vaccination.

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KEYWORDS

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Introduction

Improving the delivery of human papillomavirus (HPV) vaccine is a public health priority in the United States.^{1,2} Despite national guidelines for the routine administration of HPV vaccine to 11- and 12-year-old adolescents, only 40% of girls and 22% of boys completed the 3-dose series in 2014.³ These persistently low levels of coverage have prompted a rapid growth in the research literature on determinants of HPV vaccination, and this work has consistently highlighted the powerful influence of healthcare providers' communication. Adolescents who receive a provider's recommendation have substantially higher odds of initiating HPV vaccination compared to those who do not.^{4–7} However, around half of age-eligible adolescents do not receive recommendations.^{8–10} Furthermore, a growing body of research suggests that those recommendation adolescents do receive are weaker than recommendations for other adolescent vaccines, such as tetanus, diphtheria, and acellular pertussis (Tdap) and meningococcal vaccines.^{11,12} Understanding and improving provider communication, particularly with regard to recommendations, is imperative to increasing HPV vaccination coverage.

To inform quality improvement efforts in this area, we systematically reviewed the literature on provider communication about HPV vaccination. We organized our review using the classic communication constructs of source (where a message originates), audience (the receiver), message (what is communicated), channel (the medium used to convey the message), and context (where and when communication occurs).^{13,14} With regard to source and audience, our aims were to understand which providers are preferred sources of information, identify

factors associated with the delivery and receipt of recommendations, and characterize the communication roles played by patients and parents in clinical decision making. We additionally sought to assess provider communication about HPV vaccination in terms of message content and style, as well as channels used to educate about HPV vaccination in clinical settings. Finally, we aimed to describe the context of HPV vaccine communication to understand how policy environments, clinical systems, and health communication interventions facilitate or constrain communication.

Methods

We searched four databases (MEDLINE, CINAHL, EMBASE, and POPLINE) in August 2015 to identify studies related to provider communication about HPV vaccination. Searches varied by database, but all used combinations of terms related to HPV, vaccination, and communication. For example, we conducted a search of MEDLINE using the following terms: ("Papillomavirus Vaccines"[mesh] OR ((hvp[tiab] OR papilloma[tiab] OR papillomavirus[tiab]) AND (vaccin*[tiab] OR immuniz*[tiab])) OR gardasil[tiab]) AND ("Health Communication"[mesh] OR "Physician-Patient Relations"[Mesh] OR communicat*[tiab] OR recommend*[tiab] OR deci*[tiab]). We identified additional studies by soliciting in-press and unpublished papers from research groups publishing in this area and by checking reference lists of papers included in our review.

We reviewed studies for inclusion using a two-step process. First, one author (MBG) reviewed paper titles and abstracts to identify relevant studies, and another (ALM) checked these

determinations. Second, we conducted full-text reviews of identified studies. In this step, one author (MBG or ALM) further assessed each study's eligibility and coded eligible studies using an abstraction form. The other author checked the data. For each step, authors resolved questions and disagreements in coding through discussion.

Eligible studies were those that used data from a US sample to report quantitative or qualitative findings related to provider communication about HPV vaccination. We defined "provider communication" to include in-person dialog among patients, parents, and providers as well as the use of educational materials or other communication interventions in a clinical setting. For the purposes of this study, "clinical settings" included primary care practices or clinics, school-based health clinics, public health department clinics that deliver vaccines, and pharmacies. We limited our review to studies with US samples to account for the unique practice and policy environments that influence HPV vaccination in this country. Excluded studies were those that reported on: only the association between receiving a provider recommendation and HPV vaccine uptake; message framing without an explicitly stated clinical context; communication in settings, such as dental offices, that do not stock HPV vaccine; reminder/recall interventions; or quality improvement interventions that did not evaluate changes in provider communication.

Results

The search yielded 2,175 unduplicated articles, 101 of which met eligibility criteria and were included in our review (Fig. 1, Table 1). Most studies (67%) were quantitative, primarily using cross-sectional survey designs. About one-third (33%) of included studies used qualitative or mixed methods. Only one study examined recorded dialog among providers, patients, and parents. A majority of studies were conducted with either health care providers (53%) or with parents (42%); about one-quarter included adolescents or young adults (25%). Most studies focused on communication about HPV vaccination for only adolescent girls (53%) with fewer focusing on either boys specifically (11%) or on both boys and girls (36%).

Source

Preferences in communication source by provider type

Studies that compared sources of HPV vaccine communication found a preference for talking with physicians versus other providers.¹⁵⁻¹⁷ For example, far more parents viewed physicians than nurses as helpful for making decisions about HPV vaccination.¹⁶ Similarly, only about one-third of young adults were comfortable getting HPV vaccine from a nurse or medical assistant without first talking with a doctor.¹⁵ Qualitative studies suggested that these communication preferences were based on the perception that physicians were most knowledgeable about vaccines as well as patients' social and medical histories.¹⁷⁻²⁰ However, two studies indicated that preferences for talking with a physician about HPV vaccination lessened after initial discussions; respondents were more open to communicating with other providers or office staff for follow-up.^{15,21} The extent to which parent and patient

preferences are currently being met is unknown; however, one recent study found that about half of physicians in a national sample did not make the initial HPV vaccine recommendation for patients in their practice, but rather relied on a nurse practitioner, medical assistant, or other provider to do so.²²

Variation in recommendations by provider factors

Studies of variation in HPV vaccine recommendations by provider factors focused on providers' knowledge, perceptions, and professional characteristics. Evidence on whether HPV-related knowledge influenced providers' communication about HPV vaccination was mixed, but suggested a modest association overall. Several quantitative studies found that knowledge was associated with recommendation intention and behavior.²³⁻²⁶ Qualitative studies further supported the hypothesis that knowledge informed provider communication, with incomplete knowledge of HPV-attributable cancers in males identified as a key barrier to HPV vaccine recommendations for boys.^{27,28} However, other studies found no association between providers' knowledge and their HPV vaccine recommendations.²⁹⁻³¹

Studies assessed a wide range of provider perceptions and their relationship to HPV vaccine recommendations, with the most important perceptions being those related to discomfort talking about sex, parental hesitancy, and the role of professional organizations. Discomfort talking about sex or sexually transmitted infections was associated with providing less frequent and lower-quality HPV vaccine recommendations,^{27,32-34} as was believing that talking about sex was a prerequisite to HPV vaccination.^{29,35,36} Perceptions of parental hesitancy toward HPV vaccination were also negatively associated with communication; providers who perceived parents as unsupportive less often recommended or intended to recommend HPV vaccine.^{12,29,33,35,37-39} Conversely, providers who perceived professional organizations as influential more often recommended or intended to recommend the vaccine.^{23-25,37,40-43}

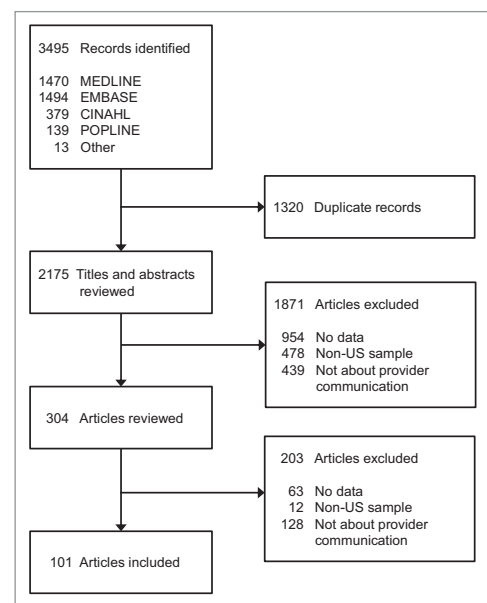


Figure 1. Flow diagram of included and excluded articles.

Other frequently studied perceptions included those related to providers' confidence in HPV vaccine and their own abilities to discuss it. For example, providers who perceived high HPV vaccine efficacy consistently reported more positive recommendation intentions and behaviors.^{29,32,37,44,45} In contrast, no studies found a correlation between providers' perceptions of HPV vaccine safety and their recommendation behaviors, perhaps because concerns about safety were relatively uncommon.^{27,32,36,38,44,45} In terms of providers' perceptions of themselves, self-efficacy to communicate about HPV vaccine was associated with recommending and intending to recommend the vaccine.^{12,26,46} Interestingly, providers who viewed themselves as "early adopters" were also more likely to recommend HPV vaccine.^{30,45,47}

Studies assessing the relationship between provider characteristics and HPV vaccine recommendations most often focused on clinical specialty and demographics. Most studies found that pediatricians reported more positive HPV vaccine recommendation practices than family physicians^{9,11,12,30,33,48-51} or other types of providers.^{12,32} Other studies failed to find variation in recommendations by specialty,^{23,34-36,40,52,53} but several of these studies did not include pediatricians.^{34,52,53} Most studies did not find variation in HPV vaccine recommendations by provider sex,^{9,23,30,36,39,44,47-49,54} but those that did most often favored female providers.^{24,25,29,33,53} Similarly, most studies did not find variation in HPV vaccine recommendations by provider age or years in practice,^{30,33,36,47,49} although a few did with mixed results.^{9,24,50} Studies assessing provider race/ethnicity suggested that minority status was associated with recommending HPV vaccine.^{9,30,32,34}

Studies of clinic or practice-level characteristics focused on the composition of patient populations in terms of race/ethnicity, insurance type, and geographic location. Providers who served a higher proportion of Hispanic patients reported more often recommending or intending to recommend HPV vaccine for boys,^{23,30} but not girls.^{23,32} In contrast, one study reported a negative association between seeing a higher proportion of non-Hispanic Black patients and recommending HPV vaccine.³² Studies of providers with higher participation in Medicaid or the Vaccines for Children program found that this participation was associated with more positive HPV vaccine recommendation practices^{9,23,30,33-35} or no effect.^{29,44,48} Provider recommendations did not vary substantially by national region,^{30,33-35,39,44} but providers practicing in urban areas more often reported recommending HPV vaccine than those in rural or suburban ones.^{34,37,44,46}

Audience

Variation in recommendations by patient factors

Studies assessing patient factors associated with receiving an HPV vaccine recommendation most often examined patient demographics and providers' perceptions of patients' risk of HPV infection. A consistent finding for adolescent patients was that providers' recommendation intentions and behavior improved with patient age, such that recommendations were stronger and more frequent for older adolescents than for those in the target age range of 11-12 years old.^{9,22-25,27,29,33,35,37,38,40,42,44,51-53,55-60} Relatively

few providers recommended or intended to recommend HPV vaccination for younger patients, ages 9 and 10.^{22,23,27,35,40,51,59} These recommendation practices corresponded with the preferences of parents, who tended to favor communicating with providers about HPV vaccination in their adolescents' teenage vs. preteen years.^{16,19,61} Among studies focusing on young adult patients, provider recommendations declined slightly in frequency for patients in their twenties.^{35,41,56,62} Two studies suggested that a minority of providers continued to recommend HPV vaccine for older adults, ages 27 and over, who fell outside of the recommended age range for catch up vaccination.^{52,63}

Provider communication was consistently associated with patients' sex such that providers' recommendation intentions and behavior were more supportive of HPV vaccination for girls versus boys.^{10,12,24,25,29,33,37,44,55,57,58,60,64,65} For example, the 2014 NIS-Teen found that 64% of age-eligible girls had received a provider recommendation compared to just 42% of boys.¹⁰ All but one study examining patients' race/ethnicity suggested disparities in provider communication with parents of African American and Hispanic adolescents less often discussing HPV vaccine with a provider or receiving HPV recommendations than parents of non-Hispanic White adolescents.^{7,64,66-70} This pattern of findings is concerning given that both quantitative and qualitative studies suggested that provider recommendations were especially influential among parents from racial/ethnic minority backgrounds.^{19,69,71-73}

Providers more often recommended HPV vaccination for patients they perceived to be at higher risk for HPV infection. Studies found that providers prioritized HPV vaccination for subpopulations including sexually active adolescents, males who might have same sex partners, and adolescents of lower socioeconomic status.^{19,33,38,44,74} Similarly, some providers based their HPV vaccine recommendations on risk-related factors such as the results of a Pap or HPV test, number of sexual partners, or relationship status.^{52,58,75} Ironically, providers in one qualitative study acknowledged that their ability to accurately assess whether adolescents were sexually active was limited.³⁸

Communication roles

Studies of parents' and adolescents' communication roles in clinical settings consistently found that a parent, most often the mother, was responsible for making the ultimate decision about HPV vaccination.^{4,18-20,71,74,76-78} However, the extent to which parents communicated about HPV vaccination beyond giving consent varied, with qualitative studies suggesting that parents from racial/ethnic minorities or with lower socioeconomic status were less likely to be engaged by providers and more likely than parents from more socially privileged backgrounds to defer to providers' advice.^{19,71,73,74,77} Parents were also more likely to follow providers' advice without question when they received a strong, unambiguous recommendation.^{38,74,77}

Findings on adolescents' role in clinical communication about HPV vaccination were also mixed. Some studies emphasized their lack of participation, particularly in the case of younger adolescents.^{4,19,74,78,79} Indeed, some parents indicated a preference for vaccinating in the preteen years specifically because they viewed adolescents as having little say during this

Table 1. Characteristics of included studies.

Author, Year	Study design	Guidelines during data collection ^a			N	Sample population	Communication constructs				
		Females	Males	Sex ^b			Source	Audience	Message	Channel	Context
Alexander, 2012 ⁷⁶	Qualitative, in-person interviews	rou	rou	M	42	Unvaccinated adolescent males (ages 13–17) and their parents (21 dyads) recruited from clinics in a mid-western city		•	•		
Alexander, 2014 ²¹	Qualitative, in-person interviews	rou	rou	M	42	Unvaccinated adolescent males (ages 13–17) and their parents (21 dyads) recruited from clinics in a mid-western city	•		•		
Alexander, 2015 ²⁷	Qualitative, in-person interviews	rou	rou	M	20	Pediatricians serving low income families in a mid-western city	•	•	•	•	
Allen, 2012 ⁷¹	Qualitative, focus groups	rou	pre	F	64	Parents of girls (ages 9–17) recruited through health and social service agencies in Boston, MA		•	•		
Allison, 2013 ⁴⁴	Cross-sectional, mail and online survey	rou	perm	M	609	Nationally-representative sample of pediatricians and family physicians	•	•	•		
Aragones, 2015 ⁹⁸	Qualitative, focus groups	rou	rou	F, M	36	Latino immigrant parents of unvaccinated children (ages 9–17)			•		
Barnack, 2010 ⁴⁸	Cross-sectional, online survey	rou	pre	F, M	200	Physicians (pediatricians, primary care physicians and gynecologists; n = 100) and parents of children (ages 7–17; n = 100)	•				
Bednarczyk, 2011 ⁷²	Cross-sectional, in-person survey	rou	perm	F	795	Women recruited from a university health clinic and classroom settings		•			
Bhatta, 2015 ⁵⁵	Cross-sectional, in-person survey	rou	rou	F, M	1299	Middle and high school students (ages 11–18) in a rural Appalachian Ohio county	•	•			
Bruno, 2014 ⁴⁹	Cross-sectional, mail survey	rou	perm, rou	F, M	121	Primary care providers (pediatricians, family physicians, and internists) serving minority populations in Brooklyn, NY	•				
Bynum, 2014 ³²	Cross-sectional, mail survey	rou	pre	F	433	Florida-based physicians serving Medicaid-enrolled females (ages 9–17)	•				
Cates, 2011 ¹⁰⁰	Cross-sectional, mail and email survey	rou	pre, perm	F	260	Mothers of adolescent daughters (ages 9–18) (n = 225) and healthcare providers (n = 35) in 4 NC counties				•	•
Clark, 2015 ⁸⁴	Cross-sectional, online survey	rou	rou	M	809	Nationally-representative sample of parents of adolescent sons (ages 9–17)			•		
Daley, 2006 ²⁹	Cross sectional mail and online survey	pre	pre	F	294	National sample of pediatricians	•	•	•		
Daley, 2010 ³⁵	Cross-sectional, online or mail survey	rou	pre	F	780	Nationally-representative sample of pediatricians and family physicians	•	•	•		•
Dempsey, 2009 ⁸⁰	Qualitative analysis of cross-sectional, telephone survey	rou	pre	F	52	Mothers of adolescent daughters (ages 11–17) seen within the University of Michigan health care system		•	•		
Dempsey, 2015 ¹⁵	Cross sectional, online survey	rou	rou	F	175	Women (ages 15–26) attending one of 9 OB/GYN offices in CO	•				
Dempsey, 2016 ⁸⁷	Cross-sectional, mail survey	rou	rou	F, M	356	Parents of children (ages 9–14) in Denver, CO metro area			•	•	
Dorrell, 2012 ⁴	Cross-sectional telephone survey	rou	perm	F, M	8652	National sample of parents of adolescents (ages 13–17)		•	•		
Fontenot, 2013 ¹⁰⁵	Cross-sectional, online survey	rou	rou	F, M	519	Forensic nurses who were members of the International Association of Forensic Nurses (95% from the US)					•
Ford, 2014 ¹⁰⁸	Cross-sectional telephone survey	rou	pre	F, M	263	Adolescent health professionals (medical providers and public health practitioners) in 43 states					•
Getrich, 2014 ⁷³	Mixed methods: Cross-sectional survey; qualitative interviews	rou	pre	F	30	Clinicians (n = 8), Hispanic mothers (n = 10) and adolescent females (ages 12–17) (n = 12) in New Mexico		•	•		•
Gilkey, 2016 ³³	Cross-sectional, online survey	rou	rou	F, M	776	National sample of pediatricians and family physicians	•	•	•		
Gilkey, 2015 ¹¹	Cross-sectional, online survey	rou	rou	F, M	776	National sample of pediatricians and family physicians	•		•		•
Gilkey, 2016 ⁶⁰	Cross-sectional, online survey	rou	rou	F, M	1495	National sample of parents of adolescents (ages 11–17)		•	•		
Gilkey, under review ¹⁶	Cross-sectional, online survey	rou	rou	F, M	1484	National sample of parents of adolescents (ages 11–17)	•	•	•	•	

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Table 1. (Continued)

Author, Year	Study design	Guidelines during data collection ^a			N	Sample population	Communication constructs				
		Females	Males	Sex ^b			Source	Audience	Message	Channel	Context
Goff, 2011 ⁷⁹	Mixed-methods analysis of audio-recorded clinical encounters	rout	pre	F	184	Clinical encounters between physicians and their female patients (ages 11–26)	•	•			
Greenfield, 2015 ¹⁷	Cross-sectional, in-person survey; qualitative focus groups	rout	rout	F, M	222	WA-based samples of Hispanic, Somalai, and Ethiopian/Eritrian adolescents (survey, n = 45) and parents (survey, n = 157); mothers of children (ages 11–18; focus groups, n = 27); providers (n = 20)	•		•		•
Griffioen, 2012 ¹⁸	Qualitative, in-person interviews	rout	–	F	65	Females (ages 11–12; n = 33) and their mothers (n = 32) recruited from an FQHC in Chicago, IL	•	•	•		
Hamlish, 2012 ⁷⁷	Qualitative, in-person interviews	rout	–	F	38	African-American females (ages 9–18) attending school in Chicago, IL or northern IN and mothers (19 dyads)		•	•		
Head, 2013 ⁹⁴	Qualitative, in-person interviews	rout	perm	F	8	Nurses and a physician in rural Appalachian KY			•	•	•
Hughes, 2011 ⁷⁴	Qualitative, in-person interviews	rout	pre	F	60	Mother-daughter-clinician triads recruited from practices in a multi-state, primary care practice-based research network		•	•		•
Ishibashi, 2008 ⁴⁷	Cross-sectional, online survey	rout	pre	F	373	Random, national sample of pediatricians	•	•	•		
Jensen, 2009 ⁴⁰	Cross-sectional mail survey	rout	pre	F, M	204	Physicians, nurse practitioners, and physician's assistants in Dane County, WI	•	•	•		
Jim, 2012 ¹⁰¹	Cross-sectional, online survey; qualitative in-person interviews	rout	pre, perm	F	319	Health care providers in all 12 Indian Health Service (HIS) areas (survey, n = 269; interviews, n = 51)					•
Kahn, 2009 ²³	Cross-sectional, online survey	rout	pre	F, M	1122	Statewide sample of physicians (pediatricians, family medicine, OB/GYN, internal medicine) in TX	•	•			
Kahn, 2005 ²⁴	Cross-sectional, mail survey	pre	pre	F, M	513	Random, national sample of pediatricians	•	•			
Kahn, 2007 ³⁷	Qualitative in-person interviews	pre	pre	F, M	31	Pediatricians practicing in OH, KY, and IN	•	•			
Katz, 2009 ¹⁰²	Cross-sectional telephone interviews; immunization database review	rout	pre	F	234	Health department personnel in 7 Appalachian states					•
Kepka, 2012 ⁵²	Cross-sectional survey	rout	pre	F	421	National sample of primary care providers (including OB/GYN, family practice physicians, internists, mid-level providers)	•	•			
Kester, 2013 ⁸⁸	Cross-sectional, online survey	rout	perm	F	501	National sample of mothers of adolescent females (ages 14–17)			•		
Klosky, 2015 ⁵⁶	Cross-sectional, in-person written survey	rout	perm	F	344	Young adult, female cancer survivors (ages 18–26, n = 114) and maternal caregivers of adolescent female survivors (ages 9–17; n = 230)		•			
Kramer, 2012 ⁶⁶	Cross-sectional, telephone survey	rout	pre	F	17,264	National, population-based sample of parents of adolescent females (ages 12–17)		•			
Krieger, 2012 ⁴⁶	Cross-sectional, mail survey	rout	pre	F	334	Pediatricians with practices in Appalachia or in non-Appalachia KY and WV	•				
Kulczycki, 2015 ³⁴	Cross-sectional mail and online survey	rout	perm	F	301	Pediatricians and family physicians from Alabama, Mississippi, and 10 randomly selected states	•				•
Lau, 2012 ⁷	Cross-sectional telephone survey	rout	pre	F	16462	National sample of parents of adolescent daughters (ages 12–17)		•			
Luque, 2012 ¹⁰⁴	Qualitative in-person interviews	rout	pre	F	63	Mexican and Honduran female farmworkers (n = 46) and health care workers (n = 17) recruited from FQHCs					•
Luque, 2014 ⁵⁷	Cross-sectional mail and online surveys	rout	perm	F, M	217	Physicians in GA (pediatricians, family medicine, OB/GYN, and other clinical specialties)		•			
Malo, 2014 ³⁰	Cross-sectional mail survey	rout	perm	M	728	Nationally-representative samples of pediatricians and family physicians	•				

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Table 1. (Continued)

Author, Year	Study design	Guidelines during data collection ^a			N	Sample population	Communication constructs				
		Females	Males	Sex ^b			Source	Audience	Message	Channel	Context
Malo, 2016 ²²	Cross-sectional mail survey	rou	perm, rou	M	355	Nationally-representative samples of pediatricians and family physicians	•	•	•		•
Mayne, 2012 ¹⁰⁹	Cross-sectional, telephone survey	rou	perm	F	162	Parents of adolescent girls (ages 11–17) who were due for HPV vaccine and had a recent primary care visit					•
McRee, 2014 ¹²	Cross-sectional, online survey	rou	rou	F, M	615	Statewide sample of physicians (pediatricians and family physicians) and nurse practitioners in MN	•	•	•	•	•
Mehta, 2012 ⁶²	Cross-sectional, telephone interviews; medical record reviews	rou	pre	F	269	Women diagnosed with precancerous cervical lesions, identified through pathology lab in New Haven County, CT		•			
Morales-Campos, 2013 ⁷⁸	Qualitative focus groups	rou	pre	F	52	Hispanic adolescent girls (ages 14–18; n = 28) and mothers (n = 24) at an urban school district in southeast TX		•	•		
Moss, under review ⁹²	Cross-sectional, phone survey	rou	pre, perm	F, M	9021	Nationally-representative sample of parents of adolescents (ages 13–17)			•		
Moss, 2016 ⁹³	Cross-sectional, phone survey	rou	pre	F	4124	Nationally-representative sample of parents of daughters (ages 13–17)			•		
Mullins, 2013 ⁸²	Cross-sectional (baseline), qualitative interviews	rou	pre	F	84	Girls (ages 11–12) who had initiated HPV vaccination (n = 33), their mothers (n = 32), and their clinicians (n = 19) (33 triads)			•		
Niccolai, 2014 ⁸³	Qualitative, in-person interviews	rou	rou	F, M	38	Clinic-based sample of parents of children (female or male; ages 10–18) in northeastern US			•		
Niccolai, 2015 ⁹¹	Qualitative, in-person interviews	rou	rou	F, M	38	Clinic-based sample of parents of children (female or male; ages 10–18) in northeastern US			•		
Perkins, 2012 ⁴¹	Qualitative, in-person interviews	rou	–	F	34	Pediatric and family medicine providers (physicians and nurse practitioners)	•	•			•
Perkins, 2012 ²⁸	Qualitative, in-person interviews	rou	pre, perm	F, M	31	Physicians and nurse practitioners at 4 community health centers in Boston, MA	•				•
Perkins, 2013 ⁵³	Cross-sectional, mail survey	rou	perm, rou	F	366	Random, national sample of OB/GYNs	•	•			•
Perkins, 2013 ⁹⁷	Qualitative, in-person interviews	rou	perm, rou	F	120	Clinic-based sample of parents of adolescent sons (ages 11–17)			•		
Perkins, 2014 ³⁸	Qualitative, in-person interviews	rou	rou	F, M	161	Adolescent males and females ages 11–21 (n = 124) and health care providers (n = 36) at 8 neighborhood health centers in Boston, MA	•	•	•		•
Perkins, 2016 ⁸⁵	Qualitative interviews	rou	rou	F	65	Clinic-based sample of parents of daughters (ages 11–17) who received at least one dose of HPV vaccine			•		
Polonijo, 2013 ⁶⁷	Yearly cross-sectional telephone survey	rou	pre, perm	F	41,358	Nationally-representative samples of parents of adolescents (ages 13–17)		•			
Quinn, 2012 ⁶³	Qualitative analysis of open-ended items on a cross-sectional, mail survey	rou	pre	F	112	National sample of pediatricians, family physicians and OB/GYNs		•			
Rahman, 2015 ⁶⁵	Cross-sectional, telephone survey	rou	perm, rou	F, M	23,564	National sample of adolescents (ages 13–17)		•			
Raley, 2004 ⁴²	Cross-sectional survey	pre	pre	F	181	Random sample of American College of Gynecology fellows	•	•			•
Rand, 2011 ⁸¹	Cross-sectional telephone survey	rou	pre	F, M	638	Parents with children (ages 11–17; n = 430) and the older daughters/sons (ages 15–17; n = 208) recruited at 9 primary care practices in Monroe County, New York			•		
Reimer, 2014 ⁶⁴	Cross-sectional in-person, self-administered survey	rou	perm	F, M	507	Adolescents and young adults (ages 15–30) recruited from waiting rooms of 3 health care clinics in a Midwestern city		•			
Reiter, 2012 ¹⁰⁷	Cross-sectional, online survey	rou	rou	M	404	National sample of parents of adolescent males (ages 11–17)					•
Riedesel, 2005 ²⁵	Cross-sectional, mail survey	pre	pre	F, M	145	National sample of family physicians (AAFP members)	•	•			

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Table 1. (Continued)

Author, Year	Study design	Guidelines during data collection ^a			N	Sample population	Communication constructs				
		Females	Males	Sex ^b			Source	Audience	Message	Channel	Context
Roberto, 2011 ⁵⁴	Cross-sectional, mail survey	rou	pre	F	406	Pediatricians in a mid-western state	•				
Roland, 2014 ⁵⁸	Cross-sectional, mail survey	rou	pre	F	98	Physicians, nurse practitioners, nurse-midwives, and physician assistants in FQHCs in IL		•			
Rosen, 2015 ²⁶	Cross-sectional, written survey	rou	rou	F, M	137	School nurses attending the Ohio Association of School Nurses conference	•				
Rosenthal, 2011 ⁸⁹	Cross-sectional mail survey	rou	pre	F	530	Women (ages 19–26) identified via claims data from a large managed care plan				•	
Same, 2014 ⁹⁵	Cross-sectional, in-person, written survey	rou	–	M	346	Clinic-based sample of men (ages 16–35) in New York, NY and Baltimore, MD				•	
Sanders-Thompson, 2012 ¹⁹	Qualitative, in-person interviews	rou	pre	F	30	African American parents of daughters (ages 9–17) in St. Louis, MO area	•	•	•		
Savas, 2012 ⁶⁸	Cross-sectional telephone survey	rou	pre, perm	F	99	Parents of daughters (ages 9–17) in Houston, TX who called the 2–1–1 Texas/United Way Helpline		•			
Schnatz, 2010 ³¹	Cross-sectional mail survey	rou	pre	F	345	Statewide sample of pediatricians in CT	•				
Shah, 2014 ¹⁰³	Cross-sectional online survey	rou	rou	M	524	National sample of parents and their sons (ages 11–19)					•
Soon, 2015 ³⁶	Cross-sectional online survey	rou	rou	F, M	71	Pediatricians and family medicine physicians in HI	•				
Staras, 2014 ⁸⁶	Cross-sectional telephone and mail survey	rou	perm	F	2127	Stratified-random sample of parents of non-privately insured adolescent females (ages 9–17) in FL				•	
Stephens, 2013 ²⁰	Qualitative in-person interviews	rou	perm	F	31	Immigrant Haitian mothers of unvaccinated daughters (ages 11–18)	•	•			
Stokley, 2014 ¹⁰	Yearly, cross-sectional telephone surveys	rou	perm, rou	F, M	89,915	Nationally-representative sample of parents of females (2007–2013) and males (2011–2013) (ages 13–17)		•			
Sussman, 2007 ³⁹	Qualitative in-person interviews	pre	pre	F	37	Primary care clinicians in New Mexico	•				
Sussman, 2015 ⁵⁹	Mixed methods: cross-sectional, in-person and telephone interviews; mail and online survey	rou	perm	F, M	123	Primary care clinicians, health policy makers, and immunization experts (interviews, n = 25) and clinician members of a primary care research network in New Mexico (survey, n = 98)	•	•	•		•
Taylor, 2012 ⁹⁶	Cross-sectional, in-person survey	rou	perm	F	96	Cambodian mothers of adolescent daughters (ages 9–18)				•	
Tissot, 2007 ⁴³	Qualitative, in-person interviews	pre	pre	F, M	31	Pediatricians in a 3-state region surrounding Cincinnati, OH	•	•			•
Vadaparampil, 2011 ⁹	Cross-sectional, mail survey	rou	pre	F	1013	Nationally-representative sample of physicians (family physicians, pediatricians, and OB/GYNs)	•	•			•
Vadaparampil, 2013 ¹⁰⁶	Cross-sectional, mail survey	rou	perm	F, M	134	Nationally-representative sample of physicians (family physicians, pediatricians, and OB/GYNs)					•
Vadaparampil, 2014 ⁵⁰	Two cross-sectional mail surveys	rou	pre, perm	F	1941	Nationally-representative sample of physicians (family physicians, pediatricians, and OB/GYNs) (n = 1013 in 2009, n = 928 in 2011)	•				
Warner, 2015 ⁹⁹	Qualitative focus groups	pre	pre	F, M	52	Latino parents of adolescents (ages 11–17) recruited from 2 community organizations				•	•
Weiss, 2010 ⁵¹	Cross-sectional mail survey	rou	pre	M	1094	Random samples of pediatricians and family physicians who vaccinated females	•	•			
Wilson, 2013 ⁶¹	Qualitative focus groups	rou	perm	F, M	44	African American, Caribbean, Haitian and African women recruited from Federally Qualified Health Centers		•	•		
Wong, 2012 ⁷⁰	Cross-sectional telephone survey	rou	pre	F	1631	National sample of women (ages 18 and older)		•			
Ylitalo, 2013 ⁶⁹	Cross-sectional, phone survey	rou	pre	F	9274	Nationally-representative sample of female adolescents (ages 13–17)		•			
Young, 2011 ⁴⁵	Cross-sectional, mail survey	rou	pre	F	385	Statewide sample of OB/GYNs and family physicians in VA	•				•

(Continued on next page)

Table 1. (Continued)

Author, Year	Study design	Guidelines during data collection ^a			N	Sample population	Communication constructs				
		Females	Males	Sex ^b			Source	Audience	Message	Channel	Context
Zimet, 2010 ⁹⁰	Cross-sectional, mail survey	rout	pre	F	185	National sample of insured women (ages 19–26)			•		
Zimet, 2011 ⁷⁵	Cross-sectional, mail and fax survey	rout	pre	F	271	National sample of physicians who deliver HPV vaccine to adolescent or young adult patients (ages 9–26)		•			

^aACIP recommendations for HPV vaccination at the time of data collection. Pre = pre-recommendation (May 2006 or earlier for females; September 2009 or earlier for males). Perm = permissive recommendation (October 2009 to September 2011 for males). Rout = routine recommendation (June 2006 and later for females; October 2011 and later for males). Dash (–) = date for data collection not reported.

^bSex of patients the study examined communication about HPV vaccination for; F = females; M = males

time.^{18,80} In contrast, other studies found that adolescents did play a role in communication and decision-making in clinical settings, one which increased with age, maturity, and social privilege.^{18,27,71,73,76,80} For some parents, the desire to maximize adolescents' role was even a reason for delaying HPV vaccination.⁸⁰ Studies suggested that parent-adolescent decisions were largely concordant and that most dyads ultimately reached agreement about the vaccination decision, but they sometimes looked to providers for guidance in the case of initial disagreement.^{76,81} Interestingly, one qualitative study noted that adolescents' participation in medical dialog was often subtle and included non-verbal forms of communication such as nods, suggesting that adolescents' communication role could be easy to overlook.⁷⁶

Message

Content

Studies of the preferred and actual content of provider communication about HPV vaccination focused on prevention topics, vaccine safety, and vaccination logistics. Of these, content related to prevention featured most prominently, with parents and adolescents most often wanting providers to discuss the specific diseases HPV vaccine prevents and its efficacy.^{18,21,82,83} In correspondence with preferred content, prevention of cancer, genital warts, and sexually transmitted infections (STIs) constituted the major topics of actual HPV vaccine communication. Almost all providers reported mentioning cancer prevention when they discussed HPV vaccination.^{33,59} However, studies of girls suggested that providers placed a higher priority on cancer prevention^{17,29,35,38,40,81} than studies of boys.^{22,27,29,40,76} For girls, discussions centered on cervical cancer prevention, and included genital warts and STIs less often.^{35,38,40,79,81} For boys, prevention topics were more varied with the prevention of genital warts and STIs featuring as or more prominently than the prevention of cancer;^{22,27,29,76} cancer topics included cervical cancer prevention for future partners and, less frequently, the prevention of male cancers in patients themselves.^{22,27,29,40,76} Several qualitative studies found that some providers chose to discuss cancer, but not genital warts or STIs, so as to avoid talking about sex;^{27,59} however, a quantitative study found that, for boys, very few providers discussed one without the other.²² Although two studies sought to assess the association between the prevention content and HPV vaccine acceptance, results were inconclusive.^{60,84}

Content about safety and side effects featured somewhat less prominently in studies of provider communication about HPV vaccination. Qualitative studies suggested that some parents and adolescents prioritized safety and side effects as important topics for discussion,^{19,21,38,61,82} but studies of actual content suggested that such communication was fairly limited.^{27,79,82} For example, one qualitative study of parents and their adolescent sons found that most recalled that their providers had told them HPV vaccination was generally safe, but few reported receiving information or asking questions about specific side effects.⁷⁶

Topics related to provider communication about the logistics of HPV vaccination were varied. Parents reported a preference for being informed of: the number of doses needed to complete the vaccine series; the vaccine's availability for boys; cost; and the recommended timing of administration.²¹ With regard to timing, some parents expressed a particular interest in the rationale for vaccinating adolescents in their preteen years vs. later.^{18,21,38} In contrast to these preferences, several studies indicated deficiencies in provider communication about how to complete the 3 dose series.^{27,76,81,85} Fewer studies assessed actual content in terms of the availability of HPV vaccine for boys, cost, and timing.^{22,76}

Style

Studies of communication style focused on four areas: 1) recommendation strength; 2) recommendation quality; 3) the framing of HPV vaccine in relation to other adolescent vaccines; and 4) collaborative communication. First, with regard to recommendation strength, quantitative studies consistently found an association between the extent to which providers endorsed the importance of HPV vaccine and parents' positive perceptions of HPV vaccine,^{60,86} their intention to get their children vaccinated,^{60,87} and adolescents' receipt of HPV vaccine.^{60,87–89} Qualitative studies also found strong provider endorsement to be uniquely influential on parents' HPV vaccination decisions.^{27,38,74,77} Unfortunately, these same studies suggested that providers often failed to strongly endorse HPV vaccine.^{11,27,38,44,47,60,86,87,89,90} For example, one national study found that only about two-thirds of parents who received HPV vaccine recommendations perceived a high level of provider endorsement.⁶⁰

Building on the notion of recommendation strength, a second series of studies found that recommendation quality, or the extent to which providers delivered guideline-consistent

recommendations, was also associated with HPV vaccination. In addition to strength of endorsement, these studies assessed the quality indicators of timeliness (i.e., routinely recommending HPV vaccine by age 12 versus later), consistency (using a routine versus risk-based approach to recommendations), and urgency (recommending same-day vaccination). A national study of primary care physicians found that half reported 2 or more lower-quality recommendation practices.³³ A corresponding survey of parents found that those who received high- versus low-quality recommendations had more often initiated HPV vaccination for their adolescents and had less often refused or delayed the vaccine.⁶⁰

A third area of communication style centered on understanding how providers communicated about HPV vaccine in relation to other vaccines; qualitative studies identified two main approaches in this regard. In one, providers framed HPV vaccine as one of several vaccines in the routine schedule, avoided drawing special attention to it, and offered their strong endorsement.^{38,74} Providers using this approach reported low levels of parental hesitancy and high levels of vaccine uptake.^{38,74} In the other approach, providers distinguished HPV vaccine from other adolescent vaccines by presenting it as an “optional” vaccine which was not required for school; this approach often involved a more lengthy discussion of risks and benefits as well as obtaining parental consent separately from, not along with, other vaccines.^{38,74,77,79,91} Providers using the second approach reported higher levels of parental hesitancy and vaccine refusal or delay, but nevertheless felt obligated to mention the absence of school entry requirements for HPV vaccine and offer the option to delay vaccination in order to more closely coincide with sexual debut.^{38,74} Providers who presented HPV vaccine as optional expressed the hope that this open-ended communication style would foster trust with vaccine hesitant parents, thereby encouraging the acceptance of other adolescent vaccines in the short term as well as HPV vaccine in the long term.³⁸ Unfortunately, some parents who delayed HPV vaccination with the intention of getting it later reported that they never followed-up to do so.^{38,91}

The extent to which providers adhere to these overall approaches of aligning HPV vaccine with or distinguishing it from other vaccines is unknown. However, the existing literature consistently supported the assertion that providers often communicated about HPV vaccine differently from other vaccines in discrete ways. Quantitative and qualitative studies found that providers spent longer talking about HPV vaccine than other vaccines,^{11,27,35,74,76,84} endorsed HPV vaccine less strongly than Tdap and meningococcal vaccines,^{11,12,22,74,87} and often presented HPV vaccine as an “optional” vaccine vs. one that was “routine” or “required.”^{12,22,38,74,79,91} Finally, one study found that, among providers with a preferred order for discussing adolescent vaccines, over two-third preferred to discuss HPV vaccine last.¹¹

A fourth area of communication style considered the extent to which providers engaged parents and patients in discussion about HPV vaccination. For example, one series of quantitative studies assessed “collaborative” communication based on parental reports of whether they discussed HPV vaccination with a provider, whether they received enough time to make a decision, and whether providers played a role in decision

making. These studies found that collaborative communication was associated with HPV vaccine uptake.⁹² However, traditionally underserved groups, such as parents of Hispanic and nonprivately insured adolescents, were less likely to report collaborative communication, which adversely affected HPV vaccination coverage for these groups.⁹³ Qualitative research generally supported the finding that providers were less likely to engage non-English speaking parents or parents from disadvantaged backgrounds in HPV vaccine-related communication.^{73,76} Subgroup differences aside, a quantitative analysis of transcribed medical encounters found that providers were verbally dominant in discussions about HPV vaccination, speaking over three-quarters of the words spoken, taking longer turns than parents, and using on average more than 11 technical terms per visit.⁷⁹ All studies that assessed who initiated HPV vaccine conversations found in favor of providers; parents and patients brought up the topic only rarely and preferred that providers initiate the discussion.^{76,77,79,87,91,94-97}

Decisional timeframe

Both qualitative and quantitative studies found that parents often preferred not to make an immediate decision about HPV vaccination during discussions with a provider, but rather wished to decide later after thinking more about the issue and getting more information.^{12,16,18,73,74,79,80} Studies suggested that providers may contribute to extending the timeframe for HPV vaccination decision making, given that many gave parents a choice about when to vaccinate or, even at times, actively suggested delay.^{33,38,60,74,77,91} For example, a national survey of physicians found that only about half usually recommended same-day vaccination for 11- and 12-year-old patients.³³

Satisfaction

No studies examined parents’ and patients’ satisfaction with provider communication about HPV as a primary focus; however, a few reported on certain aspects of parent satisfaction, such as receiving adequate time and informational support. For example, most parents participating in the 2010 NIS-Teen reported that their daughters’ providers did give them enough time to discuss HPV vaccine; however, this perception was less common among parents of unvaccinated versus vaccinated daughters.⁴ One small study found that most parents who discussed HPV vaccination with a provider reported receiving adequate information on prevention topics.⁸⁴ In contrast, qualitative studies with parents from racial/ethnic minority backgrounds suggested some degree of dissatisfaction with HPV vaccine communication, with some parents reporting too little information, limited opportunities to ask questions, or ambiguous recommendations.^{61,71,77,78,98,99} For these parents, the perception that providers were withholding information was a source of confusion that introduced doubt about the value of HPV vaccination, discouraged vaccine acceptance, and in some cases undercut parents’ trust in providers.^{61,71,77,78,98,99} Parents emphasized their desire for clear, unambiguous messages from providers about the importance of HPV vaccination.^{38,71,77,99}

Channel

Relatively few studies assessed modes of clinical communication about HPV vaccination beyond provider dialog, but those that did focused primarily on written materials. Written brochures and fact sheets, such as the CDC's Vaccine Information Sheet,^{12,87,100-103} and posters^{87,100} were commonly used in traditional primary care settings to support provider communication about HPV vaccination. In studies examining preferred materials, both parents and providers favored brief written materials,^{12,16,87,94,100,101,103} with parents additionally expressing interest in websites.^{87,103} Parents and providers across several studies voiced the need for educational materials that were tailored to parents' cultural background, language preference, and literacy level.^{12,43,94,99,101,104} Given concerns about literacy, some providers suggested video as a promising educational channel,^{43,94} but only a minority of parents viewed informational videos as helpful.¹⁶ Notably, no studies examined educational materials designed specifically for adolescent patients themselves.

Context

Visit type

Studies assessing visit type found that almost all providers who discussed HPV vaccination used well-child visits to do so, whereas only about three-quarters used school physicals, and about half used camp or sports physicals.^{17,22} Fewer providers reported discussing HPV vaccine during visits for acute care, even when patients' complaints were mild.^{11,22,41,63,105} Providers perceived communicating about HPV vaccination to be difficult in the context of acute care, with concerns including the lack of time or fear that parents might blame the vaccine if the child's illness worsened.^{11,59} Despite avoiding HPV vaccine communication during acute care visits, some providers acknowledged that such visits were sometimes their only contact with adolescents, particularly older adolescents who they perceived as less likely to make well-child visits.^{59,73,85}

Barriers to communication

Studies assessing barriers to provider communication about HPV vaccination considered both policy- and clinic-level factors. Although providers reported being highly motivated to follow practice guidelines, many perceived guidelines for HPV vaccine administration to be complex and unclear; indeed, providers with this perception recommended HPV vaccination less often.^{27,34,59,106} Providers also perceived the lack of school entry requirements for HPV vaccination as a barrier to making strong recommendations because of the implicit assertion that HPV vaccine was less important than Tdap and other recommended vaccines.^{9,11,41,63,74} Other studies suggested that policies requiring parental consent prior to HPV vaccine administration to minors may be a barrier to direct communication with adolescents.^{107,108}

In terms of barriers related to the clinical environment, studies most often identified deficiencies in scheduling as limiting provider communication about HPV vaccination. Providers identified patient reminder/recall as critical to their efforts to recommend HPV vaccination, but many reported that they did

not use these systems, and instead relied on patients to initiate scheduling.^{11,43,59,85,94} Finally, providers reported that time constraints in the clinical encounter were also a barrier to HPV vaccine communication.^{9,11,12,35,41,45,59,63}

Interventions to improve communication

Only two studies evaluated the impact of interventions on providers' HPV vaccine communication. One study tested a multi-component, clinic-based intervention that included provider education and provider alerts in patients' electronic medical records; parents of adolescent patients who attended intervention clinics were more likely to discuss HPV vaccination with a provider, but were no more likely to receive a strong recommendation.¹⁰⁹ A second study evaluated a social marketing campaign that included public service announcements and the provision of clinic-based educational materials to parents of adolescents; most providers who participated reported that the campaign made them more likely to discuss and recommend HPV vaccination.¹⁰⁰

Discussion

Findings from this systematic review of over 100 quantitative and qualitative studies suggest that healthcare providers face a highly complex communication environment when discussing HPV vaccination in clinical settings. First, the audience for clinical communication is not uniform; studies noted that patients could present with or without their parents and that expectations about the communication roles accorded to each of these parties shifted with patients' age and maturity, as well as with parents' preferences.^{18,27,71,73,76,80} In addition to age, patients' sex added complexity to communication, with providers offering different prevention messages to boys and girls.^{17,22,27,29,35,38,40,76,81} Second, at the interpersonal level, many providers perceived parents as being unsupportive of HPV vaccination, a view which hindered guideline-consistent delivery of recommendations.^{12,29,33,35,37-39} Third, studies consistently documented a challenging policy context, including unclear practice guidelines and a lack of school entry requirements for HPV vaccination.^{11,27,34,59,74} Finally, participants across several studies perceived clinical systems as un conducive to communication due to factors such as time constraints and deficiencies in reminder/recall systems.^{11,43,59,85,94} In these ways, an audience with dynamic communication needs came together with unsupportive interpersonal, policy, and clinical contexts to create challenges for effective HPV vaccine communication.

Given these complexities, it is perhaps not surprising that the research literature documented shortcomings in provider communication about HPV vaccination. Communication practices such as describing HPV vaccine as "optional," differentiating it from other adolescent vaccines, failing to endorse it strongly, and recommending delayed vs. same-day vaccination^{33,38,60,75} were common and likely compromised providers' ability to deliver HPV vaccine according to national guidelines. Although some providers expressed the hope that merely offering, rather than strongly endorsing, HPV vaccine would honor parents' preferences and earn their trust,³⁸ the findings of this review suggest that this view is likely misguided. Rather,

qualitative research suggests that parents found open-ended communication ambiguous, frustrating and worrying, leading them to delay HPV vaccination for their adolescents.^{61,71,77,78,98,99} Instead of encouraging shared decision making, mixed messages appeared to lead to a “default” communication style in which neither providers nor parents engaged in the decision-making process.¹¹⁰

Findings also provide evidence of communication disparities in terms of who receives a provider recommendation for HPV vaccination. More specifically, parents of younger adolescents, males, and adolescents from racial and ethnic minorities less often received recommendations. This pattern of findings is concerning given that HPV vaccination is more effective when administered to preteens versus older adolescents and may be especially beneficial for traditionally underserved populations who experience a disproportionate burden of cervical cancer later in life.¹¹¹ Although HPV vaccination coverage among adolescents from racial and ethnic minorities tends to be on par with or higher than coverage for non-Hispanic Whites, eliminating communication disparities could raise coverage for these high priority populations even higher. Studies also indicate that many providers used risk-based approaches to recommending HPV vaccine, prioritizing the vaccine for adolescents they perceived as likely to be sexually active.^{33,52,74,75} Such risk-based strategies have been shown to be ineffective given the extremely high prevalence of HPV infection and the difficulty of accurately predicting adolescents’ sexual debut.¹¹²

In terms of implications for clinical practice, this review highlights several promising approaches for communicating about HPV vaccination (Table 2). More specifically, quality improvement efforts aimed at strengthening provider communication about HPV vaccination should emphasize the need to say HPV vaccination is important, recommend same-day vaccination, and deliver routine recommendations to all 11- and 12-year-old patients.^{38,74} Other promising strategies include emphasizing cancer prevention benefits and discussing HPV vaccine at the same time and in the same way as other recommended adolescent vaccines.

This review suggests opportunities for additional research, particularly in the areas of communication source and audience, by raising questions about the relative roles of parents, patients, and providers in HPV vaccine communication. The extent to which parents wish to engage in communication about HPV vaccination—or the impact of their engagement on their HPV vaccination decisions—is largely unknown and warrants further study. In the case of patients, the findings of this review suggests that the communication role of adolescents is under-represented in the research literature, particularly given that several studies found that adolescents can have a positive influence on HPV vaccine decision making.^{4,76} In the case of providers, this review found that, although parents preferred to communicate with physicians, other providers, including nurse practitioners and medical assistants, were often responsible for delivering recommendations. Given this discordance, more research is needed to understand what impact the source of HPV vaccine recommendations has on uptake and how to delegate communication roles among the care team to maximize efficiency.

It is noteworthy that our search identified only two studies that sought to measure the impact of interventions on provider communication about HPV vaccination.^{100,109} Additional intervention research is urgently needed to evaluate approaches for supporting effective provider communication and to prospectively evaluate the impact of those interventions on HPV vaccine uptake. Message testing to understand the impact of providers’ communication content on parents’ HPV vaccine decision making and satisfaction could be especially useful. Although the broader literature on message framing has yield mixed results as to the benefits of gain- versus loss-framed messages,¹¹³⁻¹¹⁵ other areas of potential importance include the relative influence of different prevention messages in terms of disease types and number of diseases,¹¹⁶⁻¹¹⁸ the length or amount of content delivered, and cognitive versus affective approaches to conveying HPV vaccine-related information.

Strengths of this systematic review include the use of two coders and a standardized form to perform data abstraction across databases in multiple fields of study. Limitations include this review’s reliance on studies that most often used relatively weak, cross-sectional designs, convenience samples, and self-reported measures of providers’ recommendation behavior and adolescents’ vaccination status. Although our narrative analytic approach was well-suited to the aims of this study and the variable quality of the available evidence, future studies should seek to use rigorous study designs to assess the impact of specific communication practices, such as the delivery of provider recommendations, on HPV vaccine uptake. Finally, we acknowledge that this review is limited in its primary focus on provider dialog; related literatures in other areas such as the use of reminder/recall and message fanning are also relevant to understanding clinical communication about HPV vaccination.

Conclusion

Improving provider communication is one of the most highly prioritized goals in the national movement to increase HPV vaccination coverage.² This review identifies promising communication practices, such as strongly endorsing HPV vaccine and using routine approaches to delivering recommendations, that can inform quality improvement efforts and potentially reduce communication disparities that currently limit HPV vaccine recommendations for younger adolescents, males, and racial/ethnic minorities. At the same time, this review suggests

Table 2. Promising practices for recommending HPV vaccination in clinical settings.

Quality	Communication practice
Strength of endorsement	Emphasize the importance of HPV vaccine
Urgency	Recommend same-day vaccination
Timeliness	Deliver recommendations by age 12
Consistency	Deliver recommendations for all adolescents, not just those perceived to be “at risk”
Prevention message	Emphasize cancer prevention
Concomitance	Recommend HPV vaccine at the same time and in the same way as other adolescent vaccines
Guidelines-based rationale	Focus on the “routine” immunization schedule versus what is “required” for school entry

that providers face substantial barriers to communicating about HPV vaccination due to challenging interpersonal, clinical, and policy contexts. Interventions are needed to support providers in recommending HPV vaccination effectively and efficiently in the highly complex communication environment surrounding HPV vaccination.

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No potential conflicts of interest were disclosed.

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