

Clinician communication strategies associated with increased uptake of the human papillomavirus (HPV) vaccine: A systematic review

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Additional supporting information may be found online in the Supporting Information section at the end of the article.

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Abstract: Human papillomavirus (HPV) is currently linked to almost 35,000 new cases of cancer in women and men each year in the United States. Gardasil-9 (Merck & Company), the only HPV vaccine now available in the United States, is nearly 100% effective at preventing precancers caused by oncogenic HPV types. In the United States, however, only about one half of adolescents are up to date with HPV vaccination. It is well known that health care clinicians' recommendations play a significant role in parents' decisions regarding HPV vaccination. A growing body of literature examines specific communication strategies for promoting uptake of the HPV vaccine. A comprehensive review of the evidence for each of these strategies is needed. The authors searched the PubMed, EMBASE, Cochrane Central Register of Controlled Trials, PsycINFO, Cumulative Index to Nursing and Allied Health Literature, and Web of Science Complete databases for original articles with a defined clinician communication strategy and an outcome of HPV vaccine uptake or intention to vaccinate (PROSPERO registry no. CRD42020107602). In total, 46 studies were included. The authors identified two main strategies with strong evidence supporting their positive impact on vaccine uptake: *strong recommendation* and *presumptive recommendation*. Determinations about a causal relationship were limited by the small numbers of randomized controlled trials. There is also opportunity for more research to determine the effects of motivational interviewing and cancer-prevention messaging.

Keywords: clinician, communication, human papillomavirus (HPV), provider, vaccination

Introduction

The human papillomavirus (HPV) vaccine, which was approved by the US Food and Drug Administration in 2006, has demonstrated ability to prevent precancer and cancer related to HPV.¹⁻³ HPV vaccine is recommended for routine vaccination at age 11 or 12 years, or as early as 9 years.^{4,5} In the United States, about 34,800 cancers per year are attributable to HPV, the majority of which are cervical and oropharyngeal cancers, but they also include anal, vaginal, vulvar, and penile cancers.⁶ Oropharyngeal cancers associated with HPV, which are not detected with routine screening, now outnumber cervical cancers and are on the rise in the United States.⁷ Research has shown complete eradication of the two oncogenic HPV types targeted by the early HPV vaccines—HPV16 and HPV18—in countries where uptake has been high.⁸ Yet current estimates show that only 54% of American adolescents have completed the HPV vaccination series (note that HPV vaccination is administered as a two-dose series for most persons who initiate vaccination at ages 9 through 14 years, or as a three-dose series for persons who initiate vaccination at ages 15 through 45 years, and for immunocompromised persons).⁹ Although this represents an improvement over the past decade, vaccine coverage still lags markedly behind public health goals and behind other vaccines recommended by the Advisory Committee on Immunization Practices.¹⁰

TABLE 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Clinician communication strategy	<p>Definition: Communication between a physician or nurse in the context of a clinical encounter</p> <p>Describes content and/or style of recommendation</p> <p>Communication between parents and clinicians as well as direct to adolescent/adult patients</p>	<p>Communication without human interaction (e.g., web-based modules or print materials)</p> <p>Reports on vaccination recommendation but style/content omitted</p>
Vaccine uptake	<p>Definition: clinical documentation or parents/clinician report of series initiation or completion; reported intent/to vaccine; clinician perception of impact on uptake; overall vaccination rate for clinic</p>	

Parental concerns about safety as well as messaging around vaccination for a sexually transmitted virus have hindered trust in the HPV vaccine and have hindered uptake.¹¹⁻¹³ The effect of these concerns has been compounded by weak endorsement of the vaccine by some health care clinicians, who may anticipate resistance from parents.¹⁴ This is concerning because health care clinicians are known to be parents' most trusted source of information regarding the HPV vaccine.¹⁵ Studies have further demonstrated that clinicians have a direct impact on parental decisions of whether to vaccinate.^{16,17} A growing body of literature examines the effect of specific clinician communication strategies on the decision to vaccinate for HPV: researchers have examined various dimensions of clinician communication, including the strength of their recommendations, the depth of their discussion, motivational interviewing techniques, and others. The purpose of this review was to establish which strategies had the best evidence for improving uptake of the HPV vaccine and thus which strategies clinicians should use and which merit further study. The animating idea behind this review is that the commitment to evidence-based practices should extend to clinicians' communication with patients and their surrogates.

Methods

Systematic searches were developed collaboratively by the lead author and a librarian experienced in systematic review methods. Searches were conducted across six databases: PubMed/MEDLINE, EMBASE through Ovid (Wolters Kluwer), Cochrane Central through Ovid, PsycINFO through Ovid, the Cumulative Index to Nursing and Allied Health Literature through EBSCO Information Services, and the Web of Science Complete Collection. Search strategies included a comprehensive list of subject headings and keywords for the two main concepts from the research question: *health care clinician communication strategies* and *HPV vaccination*. The full search strategies for all databases are available in the online Supporting Information. No date or language limits were applied in the searches. Each search was run from database inception until December 12, 2018, then updated on February 7, 2022.

Study Selection

We followed the two-stage methodology described in the Cochrane handbook and used Covidence software for study selection. In the first stage, two independent screeners reviewed titles and abstracts for those studies relevant to the research question. We defined relevance as studies that described the communication efforts of health care clinicians, which refers to licensed, independent practitioners (physicians or nurse practitioners). Although many staff members in clinical and administrative roles may be engaged in encouraging vaccination, our purpose was to more narrowly identify which strategies could be recommended for use by a health care clinician in a clinical encounter. All disagreements were resolved through discussion.

At the full-text level, we followed this same dual-screener process to evaluate eligibility for inclusion in the analysis. We excluded studies that did not investigate a specific clinician communication strategy; studies that described or quantified the influence of the clinician but did not specify the content or style of communication; and studies that did not include vaccine uptake as a discrete outcome, whether from clinical or billing data, patient/parent self-report, intention to vaccinate, or clinician perception. Quantitative and qualitative studies were considered eligible for inclusion. We restricted our study to the United States because the challenges to HPV vaccine administration vary greatly in substance and rank between countries. Disagreements regarding full-text review were resolved through discussion. A third reviewer evaluated the final set of included studies to confirm that inclusion and exclusion criteria were met (Table 1).

Data Abstraction

Data were extracted by two reviewers who cross-checked one another for accuracy. Data were extracted on communication strategies, the outcome of vaccine uptake, study design, site, population sampled, numbers of study participants, and summary of main findings and conclusions. We developed a coding system to highlight themes that emerged in terms of communication strategies. Recommendation categories

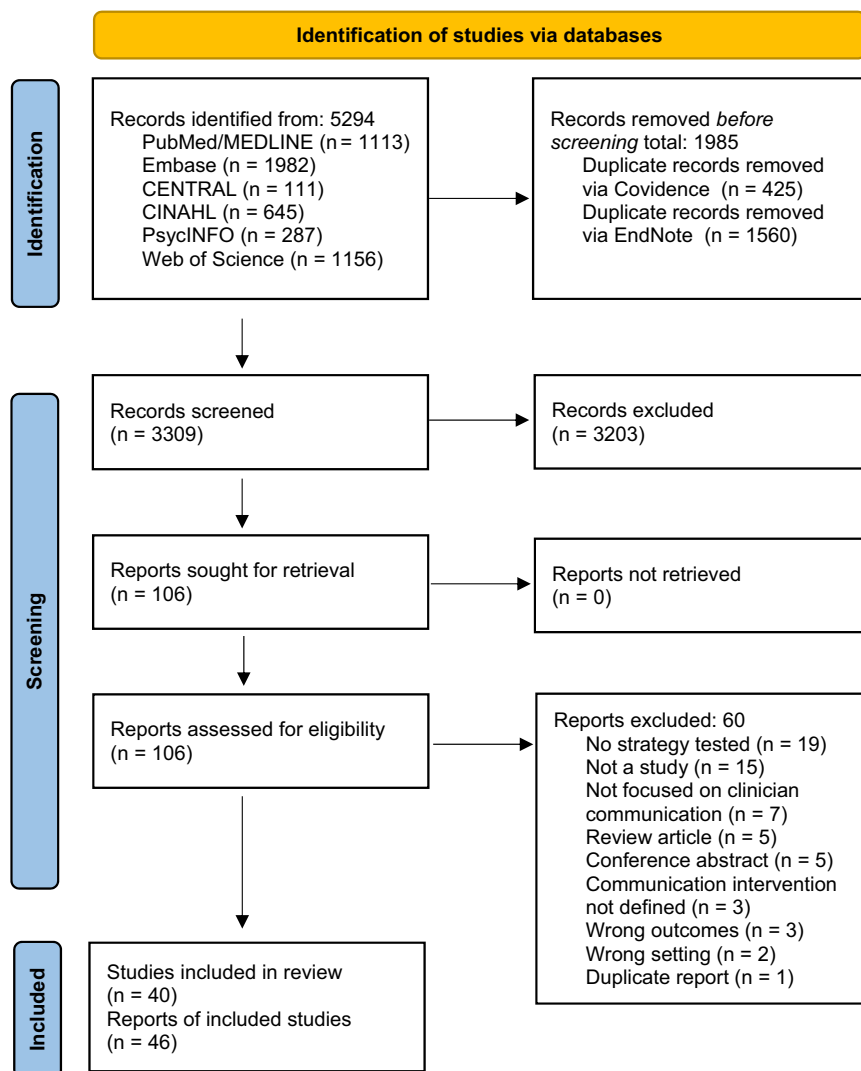


FIGURE 1. Flow diagram of included and excluded articles. From: Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi:10.1136/bmj.n71 (Open Access). Copyright © 2021, BMJ Publishing Group Ltd.

were identified as follows: strong, presumptive, personal, in-depth discussion, emphasizing favorable risk/benefit profile, motivational interviewing.

Quality Assessment

Quality assessment was performed using The Mixed Methods Appraisal Tool (MMAT).¹⁸ All included studies met the screening criteria, framed as the following two questions: “Are there clear research questions?” and “Do the collected data allow one to address the research questions?” All studies were scored on an ordinal scale based on the answers to five questions posed for each study type, according to the MMAT framework. The score is presented using stars (*): e.g., five stars signifies that 100% of quality criteria are met (high-quality evidence), three stars signifies that 60% of quality criteria are met (moderate-quality evidence), and one star signifies that 20% of quality criteria are met (low-quality evidence; see Table S1).

Findings and Relevance

Database searches initially retrieved 5294 citations for screening. After computerized duplicate removal of 1985 studies, 3309 studies were screened for relevance by title/abstract. After screening out 3203 studies that were not relevant, 106 studies had the full text retrieved and were screened using the eligibility criteria. See the Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow chart for more details about this process (Figure 1).

Forty studies and 46 reports of included studies that described the relationship between clinician communication strategies and HPV vaccine uptake were included. In several cases, multiple reports from the same study were identified. With the exception of a study that was divided into two reports of male and female patients—both included in the main table—one primary report for each study is included in the main body of Table S2, and additional reports from the same study were collated beneath (see Table S3).

TABLE 2. Categories of Communication Strategies With Strong and Weak Evidence

Strategy	Definition	Studies
Strong evidence		
Strong recommendation	Strong language in favor of vaccination and/or persistence	Ariyo 2018, ¹⁹ Brown 2017, ²⁰ Clark 2016, ²¹ Dempsey 2016, ⁶² Dempsey 2019, ^{22a} Donahue 2015, ²³ Fu 2017, ²⁴ Garbutt 2018, ²⁵ Gilkey 2016, ¹⁶ Greenfield 2015, ²⁶ Gunn 2020, ²⁷ Kempe 2019, ²⁸ Kornides 2018, ²⁹ Rosenthal 2011, ³⁰ Shay 2018, ³¹ Shay 2016, ³² Shay 2018, ^{31a} Staras 2014, ³³ Sturm 2017, ³⁴ Vielot 2020, ³⁵ Vu 2021, ³⁶ Wilson 2016 ³⁷
Presumptive recommendation	Presumptive/paternalistic; bundling with other adolescent vaccines and discussing in the same manner	Bernstein 2022, ³⁸ Brewer 2017, ³⁹ Brewer 2021, ⁴⁰ Chuang 2017, ⁴¹ Dempsey 2018, ¹⁷ Dempsey 2019, ^{22a} Fenton 2018, ⁴² Fenton 2021, ⁴³ Garbutt 2018, ²⁵ Gunn 2020, ²⁷ Hughes 2011, ⁴⁴ Kempe 2019, ²⁸ Moss 2016, ⁴⁵ Rand 2018, ⁴⁶ Sturm 2017, ³⁴ Szilagyi 2021, ⁴⁷ Wallace-Brodeur 2020 ⁴⁸
Weak evidence		
Motivational interviewing	Partnering with the parents to identify their concerns and address them	Brewer 2017, ³⁹ Dempsey 2018, ¹⁷ Perkins 2015, ⁴⁹ Reno 2019, ^{50a} Reno 2018, ^{51,52a} Wermers 2021 ⁵³
In-depth discussion	Longer duration and/or greater complexity of discussion	Clark 2016, ⁵⁴ Goff 2011, ⁵⁵ Kornides 2018, ⁵⁶ Rand 2011, ⁵⁷ Smith 2016 ⁵⁸
Emphasizing favorable risk/benefit profile	Citing cancer prevention and/or STI prevention; citing safety	Alexander 2012, ⁵⁹ Ariyo 2018, ¹⁹ Chuang 2017, ⁴¹ Dailey 2017, ⁶⁰ Fenton 2018, ⁴² Gilkey 2016, ¹⁶ Kornides 2018, ⁵⁹ Pierre-Victor 2017, ⁶¹ Shay 2018, ³¹ Vu 2022 ³⁶
Personal recommendation	Citing personal examples, e.g., about vaccinating one's own children	Ariyo 2018, ¹⁹ Garbutt 2018, ²⁵ Sturm 2017 ³⁴

Abbreviation: STI, sexually transmitted infection.
^aThese are reports of the included studies.

We included all studies that met our inclusion criteria for analysis in Table 2, and reports of the included studies are indicated in the same table.^{16,17,19–62}

Most studies (24 of 40) investigated clinic-based samples of parents of adolescent patients. Patients ranged in age from 9 to 26 years, but most were minors with parents consenting for vaccination. Eleven studies focused on underserved populations, including three based in immigrant communities. Twelve studies conducted surveys that drew from nationally representative samples. Most studies included parents of both male and female adolescents. Of note, the earliest studies that met the inclusion criteria date were from 2011, the year the Advisory Committee on Immunization Practices updated their recommendation to include males. A smaller number of studies investigated females only (nine studies), and only two studies examined males only. The majority (32 of 40 studies) used a quantitative or mixed-methods design. The communication strategies identified in this review are outlined in Table 1.

Evidence for Efficacy of a Strong Vaccination Recommendation from Clinicians

The strategy with the best evidence for promoting uptake was what study authors termed a *strong recommendation* (N = 20 studies; 22 reports of included studies). All except one were of higher quality (80%–100% of quality criteria met). The only negative study in this category was limited by small numbers of clinicians who offered a strong recommendation (five of 75 studies); however, even that study showed a

statistically insignificant trend of higher uptake with stronger recommendation (26%, 31%, and 40% for weak, moderate, and strong recommendation, respectively).³⁴ Notably, the majority of studies in this category assessed the strength of the clinician recommendation in surveys either as a dichotomous variable or on a Likert scale, limiting interpretation of what qualified the message as *strong* and whether it related more to style or to content of the message. Based on studies with qualitative or mixed-methods designs, it is possible to extrapolate that *strong* recommendations were forceful in tone but often also included a rationale; for example, one qualitative study reported a physician responding in an interview:

One of the things that makes a difference in people getting a vaccine is providers giving a strong recommendation. So rather than saying, “hey, do you maybe want to get a shot today,” saying like, “hey, I noticed that you are due for this shot, and we recommend that all of our patients get it because of X, Y, Z,” and patients are more likely to get it if you give them kind of a confident recommendation as their provider.¹⁹

Another mixed-methods study reported a nurse practitioner describing a strategy in which “going into the discussion with confidence as a provider is the most important aspect to how the results play out” while also placing an emphasis on cancer prevention.²⁷ Included transcripts of clinical encounters also highlight the use of the first-person voice as an important feature of a strong recommendation (“I do, however, recommend it completely between now and being 18”) versus the third-person voice for weak recommendations

(“they do recommend it for boys”).³⁴ Study authors did not report on whether specific guidelines were being referenced when third-person pronouns were used. Shay et al. also defined a strong recommendation as including the use of first-person pronouns (*I* or *we*) as well as adverbs and verbs conveying personal ownership of a strong recommendation (e.g., *highly recommend*).³²

Presumptive style

Studies also consistently found increased vaccine uptake with the use of a presumptive communication strategy ($N = 16$ studies; 17 reports). Of the 16 studies, 13 were of higher quality. Two of these studies were randomized controlled trials (RCTs) describing the effect of clinician communication training.^{39,63} In one, clinics were randomized to receive no training (control), announcement training in statements that presume parents are ready to vaccinate, or conversation training in open-ended discussions. Only the announcement training was effective in increasing series initiation, but not completion.³⁹ The other RCT tested a five-pronged intervention that included training in a presumptive communication style and motivational interviewing in addition to other decision aids; the study found an increase in series completion in the intervention group. The authors postulated that the inclusion of motivational interviewing in their training helped explain the more sustained increase in vaccine uptake when compared with the training provided by Brewer et al. One qualitative study described the use of words like *due* or *needed* in defining the presumptive strategy. In the same study, value statements—e.g., discussion about cancer prevention—were not associated with vaccine uptake.⁴² The presumptive strategies most commonly used by clinicians in the included studies entailed not only presenting the recommendation as a statement not requiring a response but also bundling the HPV vaccine together with other recommended adolescent vaccines, thereby presuming no special hesitancy for the HPV vaccine.^{25,27,34,41,44,50,57} For example, in one study, a physician introduced the HPV vaccine by saying: “Got a couple of shots today. The ones you’re getting are Adacil, Menactra, and the HPV.”³⁴

Motivational interviewing

Four studies looked at the effect of training in motivational interviewing or shared decision making, with mixed results.^{39,49,50,63} Three of the four studies were of lower quality evidence (40%–60% of quality criteria met). The higher quality study was an RCT by Dempsey and colleagues who studied motivational interviewing as one element of a five-pronged intervention associated with increased series initiation and completion.⁶³ Motivational interviewing, specifically, was perceived by clinicians in the study to be a successful strategy. Perkins and colleagues similarly found a positive effect on vaccine initiation where motivational

interviewing was used, but the intervention included numerous other components, including education, individualized feedback, and quality-improvement incentives to raise vaccination rates.⁴⁹ Another RCT that randomized clinicians to receive announcement training (presumptive strategy) versus conversation training using principles of shared decision making found no effect in the shared decision-making arm, but there was a positive effect for young adolescents in the announcement training arm.²³

In-depth discussion

Five studies examined the effect of longer or more in-depth discussion with patients. Two studies linked a greater amount of time spent discussing the vaccine or allowing for questions with vaccine uptake.^{54,58} Another study found no difference in uptake based on the patient-perceived quality of the communication (listening carefully, explaining things well, respecting concerns, and spending enough time).⁵⁷ The use of more technical language and a greater number of words was not associated with uptake in one study.⁵⁵

Emphasizing favorable risk/benefit profile

The evidence for including a cancer or sexually transmitted infection-prevention message was mixed. Two survey-based studies that examined the effect of a Centers for Disease Control and Prevention-endorsed communication strategy included preventive messaging as one of the three components, but the study designs did not allow attribution of the increase in uptake to specific components of the *high-quality* recommendation, which also included making a strong and urgent recommendation.^{56,64} In one study, young women recalled their parents being positively influenced by a cancer-prevention message but negatively influenced by sexually transmitted infection-prevention messaging.⁶¹ Conversely, fathers of male patients were positively influenced to vaccinate by reference to prevention of genital warts.⁵⁹ One study found that a strong and personal recommendation was even better received when accompanied by a cancer-prevention message.¹⁹ The study by Fenton et al. that demonstrated a positive impact of a presumptive strategy found no effect with discussions of cancer prevention.⁴²

Personal recommendation

The evidence for a personalized message (e.g., citing examples of the clinician’s own children) was also limited, with only three studies identified. One study found increased clinician perception of efficacy—a weaker measure of uptake—with the personalized strategy.¹⁹ Another found an association with higher performing clinics and strong, presumptive, and personal recommendations, but without examining these approaches individually.²⁵ A third study found no effect of a personalized message on HPV vaccine uptake.³⁴

Discussion

Clinician recommendation is robustly associated with HPV vaccine initiation and completion.⁶⁵ Findings from this systematic review suggest that two main strategies are driving this association: the strong recommendation and the presumptive style of recommendation. It is noteworthy that these two strategies are likely to be more efficient for clinicians than some of the strategies for which there is less evidence (e.g., motivational interviewing, in-depth discussion). A recent study of the effect of clinician recommendation style on discussion length found that an *indicated* style (stating that the vaccine was due and not optional, similar to the presumptive style) shortened the discussion time by 41 seconds while simultaneously improving vaccine uptake compared with the more *elective* presentation style. Importantly, the authors found that this type of communication style is used less often for the HPV vaccine than for other adolescent vaccines.⁴³

Where the strong and presumptive strategies may fail is in addressing safety concerns, and parental distrust in the safety of the HPV vaccine is assuredly a major factor limiting its acceptance based on parents' own reports.^{13,66} Interestingly, although Staras et al. found that parents who received a strong recommendation were more likely to believe the vaccine was safe, where belief in its safety was also correlated with uptake.³³ It may be the case that clinicians delivering strong recommendations inspire as much—or more—confidence in parents as they would by directly confronting safety concerns. The difficulty with combating vaccine hesitancy by directly refuting safety concerns has already been established in the context of the MMR vaccine.⁶⁷

Some health care clinicians may be averse to the presumptive style because it is paternalistic in nature. In light of this point, we make two practical recommendations. First, clinicians should receive training and practice communicating in this manner. Second, clinicians should reflect on all of the other ways they engage in justified paternalism: double checking patients' understanding when they refuse recommendations, requiring patients to reconfirm appointments, nudging, and many other acceptable behaviors. This reflection should involve a refresher on the criteria of patient and surrogate decisional capacity, which are arguably unsatisfied when the risks of cancer are not understood or appreciated, when the safety concerns about the vaccine are overstated or based in misinformation, or when the squeamishness of conceiving of one's child as a sexual creature interferes with one's capacity to reason about their best interests. This reflection should also involve a refresher on the elements of justified paternalism: when there are significant reasons making it worthwhile; when public discussion would show the intervention's legitimacy and acceptability; when the beneficiary lacks full decisional capacity; and when the intensity, severity,

and duration of the intervention and its consequences relate appropriately to those of the harms thereby averted.⁶⁸ Also, we must not forget that because HPV is transmissible, the benefits accrue not only to the vaccinee but also to his or her community. Therefore, it is not just good medicine but good public health. All of this suggests that not only is justified paternalism commonplace in contemporary American medicine, but also that adopting a presumptive style is ethically unproblematic despite its being paternalistic.

Notwithstanding the more powerful evidence in favor of strong and presumptive approaches over more content-based messaging, it can be argued that there is an ethical imperative to educate parents about the known risks and benefits of public health interventions and to dispel misinformation. We do not recommend against delivering a message that emphasizes the favorable risk/benefit profile of the vaccine, given especially that there is some evidence backing these communication approaches, particularly when they are combined with the strong and presumptive communication styles. The Centers for Disease Control and Prevention recommends mentioning the vaccine's cancer-prevention role as part of effective communication.⁶⁹ However, we do encourage clinicians to discuss the HPV vaccine in the same manner as other vaccines being given on the same day and suggest that the substance of the message be delivered in a strong manner. All clinicians who deliver adolescent vaccines should be well trained these in communication strategies, and this training ought to begin in medical school.

Limitations of this review include the methods of many of the included studies, the majority of which were observational. Several different measures of HPV vaccine uptake were used that may have varied in reliability, e.g., many survey-based studies used physician perception of efficacy as a measure of increased uptake. Some studies reported on strategies used in clinics with high rates of uptake, a measure that provided indirect evidence of efficacy but limited attribution of uptake to individual strategies. Studies done outside the United States were excluded from this review, which led to the exclusion of a large body of evidence. This omission limits the cross-country generalizability of the study but can also be seen as a strength, given the different challenges and policy settings of other countries with HPV vaccination programs.

Conclusion

Lack of parental confidence in the HPV vaccine remains a stubborn problem despite a favorable safety profile and clear preventive benefit for the adolescent. Effective health communication on this topic is vital to increasing vaccination rates. There is good evidence that strong recommendations and a presumptive

manner of recommending positively affect vaccine uptake. Thus these communication strategies should be considered evidence-based practices, and clinicians should use them when recommending HPV vaccination. Raising awareness about the advantage of these strategies is a priority given the evidence that clinicians tend to recommend the HPV vaccine *less strongly* than other adolescent vaccines. In addition to being effective, these strategies are time-efficient, free of cost, and thus are low-hanging fruit and should be the first strategies attempted. More

research is needed to directly compare combination strategies (e.g., cancer-prevention messaging and a presumptive style) with their individual components to determine whether the positive effect of the highlighted strategies is augmented by the combination. Widespread implementation of known successful strategies will have the ultimate effect of reducing the incidence of HPV-associated precancer and cancer in the United States. ■

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