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Health Care Provider Knowledge Around Shared Clinical Decision-Making Regarding HPV Vaccination of Adults Aged 27–45 Years in the United States

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Abstract

Background: The Advisory Committee on Immunization Practices (ACIP) recommends shared clinical decision-making (SCDM) regarding HPV vaccination for adults aged 27–45 years who are not adequately vaccinated. The objective of this survey was to understand physician knowledge, attitudes, and practices regarding HPV vaccination in this age group.

Methods: An online survey was administered in June 2021 to physicians who reported practicing internal medicine, family medicine, or obstetrics and gynecology (targeted N=250 in each practice specialty), selected randomly from potentially eligible physicians from a panel of 2 million U.S. health care providers.

Results: In total, 753 physicians participated in the survey: 33.3% practiced internal medicine, 33.1% practiced family medicine, and 33.6% practiced obstetrics/gynecology; 62.6% were male and mean physician age was 52.7 years. Despite the COVID-19 pandemic, at least a third of participating physicians in each practice specialty reported having more HPV vaccine SCDM discussions with patients aged 27–45 years in the past 12 months. While a majority of physicians (79.8%) reported being aware of the SCDM recommendation for adults in this age group, only half of physicians answered an objective knowledge question about SCDM recommendations correctly.

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Conclusions: Findings suggest that there are physician knowledge gaps related to SCDM for HPV vaccination. To improve access to HPV vaccination for people most likely to benefit, increasing availability and use of decision aids to support SCDM discussions might help healthcare providers and patients jointly make the most informed decisions about HPV vaccination.

Keywords

Human papillomavirus vaccine; HPV vaccines; adult vaccines; shared clinical decision-making

Introduction

Human papillomavirus (HPV) infection is the most common sexually transmitted infection in the United States and worldwide.¹ Persistent infection with high-risk (oncogenic) HPV types can lead to development of cervical, anal, penile, vaginal, vulvar, and oropharyngeal cancers, usually years to decades after initial infection.² Safe and effective HPV vaccines have been available in the United States since 2006. The Advisory Committee on Immunization Practices (ACIP) and Centers for Disease Control and Prevention (CDC) recommend routine HPV vaccination for adolescents at age 11 or 12 years and vaccination can start at age 9 years; catch-up vaccination is recommended through age 26 years.^{3–6} HPV vaccination is most effective when administered before exposure to HPV types against which the vaccine protects.^{7, 8} However, vaccination after prior exposure to one or more HPV vaccine types can still provide protection against the remaining vaccine types.

In 2014, the Food and Drug Administration (FDA) approved a 9-valent HPV vaccine, which protects against new infections with the seven high-risk HPV types causing the majority of HPV-related cancers and two HPV types causing the majority of anogenital warts.⁶ Since late 2016, this has been the only HPV vaccine distributed in the United States.⁵ In 2018, FDA approved a supplemental application from the manufacturer of the 9-valent HPV vaccine, expanding the age indication to include people aged 27–45 years.⁹ While HPV vaccines are considered safe for use in adults aged 27–45 years, and vaccine efficacy has been demonstrated,¹⁰ overall vaccine effectiveness in preventing HPV-related cancers or pre-cancerous conditions and genital warts is lower in older age groups because acquisition of HPV typically occurs soon after first sexual activity. Population benefits of HPV vaccination are expected to be minimal for previously unvaccinated adults in this age range.¹¹ In 2019, ACIP and CDC recommended shared clinical decision-making (SCDM) regarding HPV vaccination for some individuals aged 27–45 years who are not adequately vaccinated, but who may benefit from HPV vaccination (i.e., who have not received a complete series of either two or three doses of HPV vaccine, depending on their age at initial vaccination and medical conditions).⁵

Health care providers and patients are partners in SCDM and can jointly consider the potential benefit of HPV vaccination in the context of an individual person's risk of new HPV infection in the future, likelihood of prior HPV exposure, and existing infection or immunity. A prior survey¹² on physicians' practices regarding SCDM for HPV vaccination for adults was performed around the same time as the ACIP's SCDM recommendation in

2019, but little is known about how health care provider knowledge, attitudes, and behaviors around SCDM with HPV vaccination of adults may have evolved, as well as the potential impact of the COVID-19 pandemic.

The current analysis uses data from a survey of physicians about their knowledge, attitudes, and practices regarding HPV vaccination of adults aged 27–45 years. Specific research objectives were to: (1) assess physician awareness of HPV vaccination recommendations for patients in this age group; (2) describe changes in the number of HPV vaccination discussions over the prior 12 months and potential drivers, including possible impact of the COVID-19 pandemic, and (3) assess physicians' confidence in their knowledge as well as objective knowledge about HPV vaccination for patients in this age group.

Methods

Sample and Procedure

An online survey on SCDM regarding HPV vaccination for adults aged 27–45 years was developed by the Healthcare and Public Perceptions of Immunizations (HaPPI) Survey Collaborative, a cooperative agreement between CDC and researchers at the University of Iowa and the RAND Corporation to survey healthcare providers and the general public on vaccine-related issues. The survey was administered to physicians who reported practicing internal medicine, family medicine, or obstetrics and gynecology (targeted N=250 in each practice specialty) who were selected randomly from potentially eligible physicians from a panel of 2 million U.S. health care providers (via Qualtrics). Physicians were eligible if they reported spending at least 50% of their time performing outpatient care and reported caring for patients aged 27–45 years. The data collection period was June 18 through June 24, 2021. This activity was approved by the Institutional Review Board at the University of Iowa, reviewed by CDC, and conducted consistent with applicable federal law and CDC policy (45 C.F.R. part 46; 21 C.F.R. part 56).

The analytic sample included respondents who passed a quality check question (i.e., answered affirmatively to the question “Do you commit to thoughtfully provide your best answers to each question in this survey?”), did not speed through the survey (i.e., total response time was not more than two standard deviations from the median duration for all survey respondents), and reached the final screen of the survey. The participation rate is not reported because the sampling frame was unknown, in accordance with American Association for Public Opinion Research reporting guidelines for survey recruitment using an opt-in non-probability panel.^{13, 14}

Measures

The survey included questions that related to the following domains, and were adapted wherever possible from a prior survey of primary care physicians on SCDM for HPV vaccination.¹²

- Awareness of ACIP recommendations regarding HPV vaccination for patients aged 27–45 years (response options were yes/no to the question “...were you aware of the ACIP recommendation for shared clinical decision-making

regarding HPV vaccination for some adults aged 27–45 years”), as well as for patients 26 years and younger (“...were you aware of the ACIP recommendation for HPV vaccination for everyone through age 26 years not vaccinated previously [i.e., catch-up vaccination])

- Perceived SCDM skills (response options were Strongly Agree, Agree, Disagree, and Strongly Disagree in response to the statements “I know what points to emphasize when having shared clinical decision-making conversations about HPV vaccination with patients aged 27–45 years” and “I feel confident that I know with whom I should have a shared clinical decision-making discussion about HPV vaccination”); analysis of these measures was restricted to those who were aware of the ACIP recommendation for SCDM based on the measure above.
- Perceived change in the number of discussions about HPV vaccination with patients aged 27–45 years over the past 12 months (response options were fewer discussions this year; same number of discussions; and more discussions this year)

Physicians’ objective HPV knowledge was also measured using eight items, which again were adapted from a previous survey.¹² Statements about HPV and vaccination were presented to respondents. Response options were True, False, and Don’t Know; Don’t Know was coded as incorrect.

The survey can be found in its entirety at the following link: https://osf.io/f6wdn/?view_only=5ddc61858e6e4a62a8aafde75b66d348

Statistical Analyses

We conducted analyses with weights to correct for potential biases in the distribution of physician respondents across gender, age (<55 years or ≥55 years), and U.S. census region, for each of the three practice specialties. Because unweighted and weighted analyses produced similar results (data not shown), we report the unweighted analyses for simplicity. We report means with standard deviation (SD) and frequencies with 95% confidence intervals to describe demographic characteristics and measures. Differences in continuous variables were measured with t-tests (or ANOVA if more than two comparisons), and in proportions by chi-square tests. All data analyses were conducted using Stata (v.14; StataCorp LLC).

Results

In total, 753 physicians participated in the survey. Respondents were evenly distributed across the three practice specialties as per the study design: 251 (33.3%) practiced internal medicine, 249 (33.1%) practiced family medicine, and 253 (33.6%) practiced obstetrics/gynecology. Survey respondents were predominantly male (471 respondents, 62.5%), with a higher proportion of female physicians practicing obstetrics/gynecology (44.7%) versus family medicine (35.7%) or internal medicine (29.5%) (Table 1). Most respondents were White and non-Hispanic (70.1%, range 62.5%–78.3% by specialty). Mean physician age

was 52.7 years (SD 9.7) and was similar by specialty. Respondents were fairly evenly distributed across the four regions of the United States. Most physicians were in private practice (72.1%, range 69.6%–73.7% by specialty) and few indicated that >10% of their patients were uninsured (16.3%, range 14.6%–17.3% by specialty).

The majority of respondents (92.8%) reported that they were aware of the catch-up HPV vaccination recommendation for persons through age 26 years (Table 2); awareness ranged from 90.4% to 96.1% by practice specialty and was highest among physicians practicing obstetrics/gynecology ($p=0.07$). Overall, awareness was lower (79.7%) for the SCDM recommendation regarding HPV vaccination for some adult patients aged 27 years through 45 years and there was more variation by specialty: significantly more obstetrics/gynecology physicians reported being aware (228 out of 253; 90.1%) compared to family medicine (187 out of 249; 75.1%) and internal medicine physicians (185 out of 251; 73.7%) ($p<0.01$). Among respondents who were aware of SCDM for HPV vaccination in this age group, the majority reported that they felt they knew what points to emphasize in a SCDM discussion (90.2% strongly agreed or somewhat agreed, range 89.5% – 91.4% by specialty; $p=0.80$) and felt confident knowing with whom they should be having these discussions (90.5% strongly agreed or somewhat agreed, range 87.7% – 92.4% by specialty; $p=0.19$).

Overall, 42.8% of physicians reported no change in the number of HPV vaccination SCDM discussions they had had with patients aged 27–45 years over the prior 12 months, which included the first year of the COVID-19 pandemic (Table 2). This varies by specialty, with obstetrics/gynecology physicians being least likely to report having had the same number of discussions compared to internal medicine and family medicine (33.6% versus 49.8% and 45.0%; $p<0.01$). At least a third of physicians in each practice specialty reported having more of these discussions during this time, with obstetrics/gynecology physicians being significantly more likely to report having more discussions than internal medicine and family medicine (53.8% versus 35.9% and 39.8%; $p=0.<0.01$).

The most commonly cited reasons for having more SCDM discussions (Figure 1) were: the physician raising the topic of HPV vaccination more often (68.6%); the physician seeing more patients in this age group who might benefit from HPV vaccination (59.1%); and the physician thinking that many patients in this age group can benefit from HPV vaccination (57.9%). Only 14.1% of physicians reported having fewer such discussions during this time. The most commonly cited reasons for having fewer SCDM discussions (Figure 2) were: fewer patients were asking about HPV vaccination (52.8%), HPV vaccination for this age group being a lower priority during the COVID-19 pandemic (40.6%), and fewer patients in this age group being seen by the physician (30.2%).

Physicians had a mean of 5.6 (SD 1.5) correct answers on the eight knowledge items (Table 3). Knowledge varied by specialty; respondents who practiced obstetrics/gynecology had slightly more correct responses (mean 6.0, SD 1.4) compared to those who practiced family medicine (5.6, SD 1.5) or internal medicine (5.1, SD 1.5) ($p<0.01$ across the three groups). Items with most incorrect responses related to the incorrect belief that ACIP recommends HPV vaccination for everyone aged 27–45 years (overall, 49.4% answered incorrectly, despite 79.8% of physicians stating they were aware of the SCDM recommendation for

this age group), and the incorrect belief that HPV vaccination will prevent progression of existing HPV infection to disease, decrease time to clear an HPV infection, or treat HPV-related disease (overall, 44.9% answered incorrectly).

Discussion

This survey conducted in June 2021 reports health care provider knowledge, attitudes, and practices regarding HPV vaccination for U.S. adults aged 27–45 years based on a 2019 national recommendation for SCDM for this age group. Despite the COVID-19 pandemic, the majority of physician respondents reported having the same number or more discussions about HPV vaccination with patients in this age group over the most recent 12 months. The reason for the report of increased number of discussions is not clear. There could have been a component of social desirability bias in responding to this survey question. Alternatively, discussions about vaccines in general could have been prompted by the COVID-19 vaccines which were relatively new at the time.

In this survey, 92.2% of physicians reported being aware of the catch-up HPV vaccination recommendation for people through age 26 years, and 79.8% of physicians endorsed that they were aware of the more recent SCDM recommendation for adults aged 27–45 years. Interestingly, on objective knowledge items, the majority of physicians incorrectly answered that HPV vaccination is recommended for everyone aged 27–45 years. The discrepancy in responses to subjective and objective knowledge questions may reflect key differences between endorsing awareness versus knowledge of the SCDM recommendation. A prior survey conducted within a few months of the national SCDM recommendation in 2019 found that only 58% of family medicine and internal medicine physicians were aware of the new SCDM recommendation for adults aged 27–45 years.¹² Our survey, conducted in 2021, found high awareness in these specialties as well as among physicians practicing obstetrics/gynecology, a specialty group not included in the earlier survey. This finding is consistent with a prior survey showing higher knowledge (based on reported adherence) of cervical cancer screening and prevention in the context of HPV vaccine among obstetrician-gynecologists compared to family physicians.¹⁵ Future research could examine the reasons for improved awareness to glean lessons learned that could be applied to other specialties. For example, the American College of Obstetrics and Gynecology offers a number of programs and efforts designed to improve maternal immunization rates for all vaccines, including HPV.¹⁶

Although HPV vaccination does not need to be discussed with all adults older than age 26 years, healthcare provider awareness of the SCDM recommendation is a prerequisite for SCDM discussions with adults who may benefit from vaccination, such as people who have new sexual partners.⁵ While patients can and do initiate SCDM discussions with their health care providers, relying on patients to be aware of HPV vaccination and raise the question of whether HPV vaccination could be beneficial might lead to health inequities. For example, adults who have a higher educational level and other cancer information-seeking behaviors have been shown to have higher awareness of HPV and HPV vaccination.¹⁷ Similarly, relying on healthcare providers' interpretation of who is most likely to benefit from HPV vaccination could lead to inequities. Increasing healthcare provider knowledge

along with awareness of the role of SCDM in HPV vaccination decisions in this age group would help increase equitable access to this decision-making process. In addition, ensuring healthcare provider access to and awareness of decision aids and resources to facilitate SCDM^{18, 19} could further bolster this process for all patients. SCDM is an inherently challenging process, but decision aids may help patients to feel better informed in making choices consistent with their own values and with more accurate risk perceptions.²⁰

Most physicians reported knowing which points to emphasize in SCDM conversations and feeling confident in whom they should engage in SCDM discussions about HPV vaccination. However, this finding is somewhat at odds with objective performance on the knowledge questions, where over half of all respondents incorrectly answered that HPV vaccination was recommended for everyone aged 27–45 years. We note that areas in which there were the largest knowledge gaps might predispose healthcare providers toward recommending vaccination (i.e., incorrectly believing that HPV vaccination is recommended for all adults, or that HPV vaccination can treat HPV-associated disease). Further exploring existing knowledge gaps could help inform health care provider education campaigns to ensure that SCDM discussions include accurate health information and reach people who are most likely to benefit from vaccination. Future research could also focus on explicitly measuring the components of the points a provider should emphasize for SCDM conversations.

This study has some limitations. First, we used a nonprobability, quota-based sample, which increases the potential for bias and limits generalizability.²¹ For example, physicians who choose to join Internet panels might be different from the general physician population. If so, findings in this paper might overestimate or underestimate healthcare provider knowledge; it is not known whether such physicians are more or less likely to be aware of vaccination recommendations. Second, the survey was administered online and only available in English; this should not be a major limitation for U.S. physicians, as this group is likely to have Internet access and a high level of English proficiency. Third, this survey was conducted at one point in time, in the second year of the COVID-19 pandemic, a time of significant turmoil in the U.S. health care system; healthcare providers' knowledge and attitudes regarding HPV vaccination may change over time. Finally, we did provide participants with information regarding the current ACIP HPV vaccine recommendations, which could have influenced some of the participants' subsequent responses, particularly for questions related to awareness (less so for the knowledge questions).

Conclusions

This report provides useful insights into physician knowledge, attitudes, and practices regarding SCDM regarding HPV vaccination for U.S. adults aged 27–45 years more than a year after a national recommendation. Despite the COVID-19 pandemic, at least a third of participating physicians in each practice specialty reported having more HPV vaccine SCDM discussions with patients aged 27–45 years in the past 12 months. While a majority of physicians endorsed being aware of the SCDM recommendation for adults in this age group, only half of physicians answered an objective knowledge question about SCDM for HPV vaccination of adults 27–45 years correctly, suggesting some physician knowledge

gaps. To improve health equity and access to vaccinations for people most likely to benefit, increasing availability and use of decision aids to support SCDM discussions, such as tools designed specifically for HPV vaccination that could take into account values and acceptability,²² might help healthcare providers and patients jointly make the most informed decisions about vaccination.

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Disclaimer:

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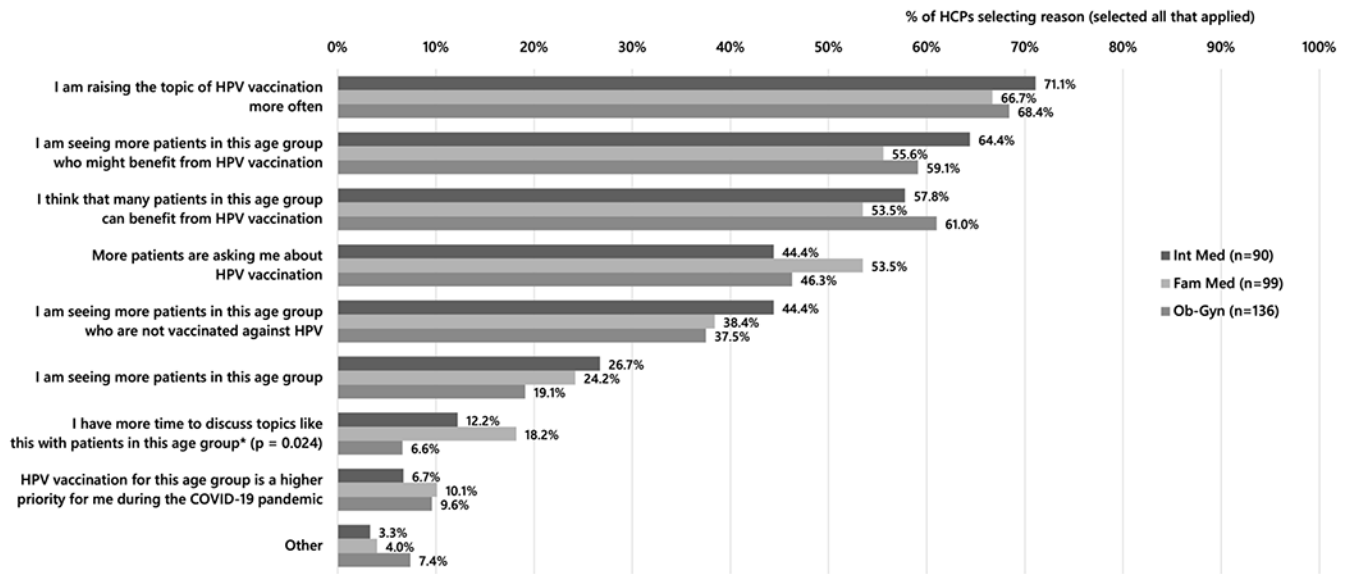


Figure 1. Reasons provided by participating physicians reporting having more HPV vaccine shared clinical decision-making discussions in the past year, June, 2021 (N=324)
 Abbreviations: HPV—Human papillomavirus; HCP, health care provider
 Note: The asterisk symbol indicates a result with statistically different results by specialty (p-value follows in parentheses)

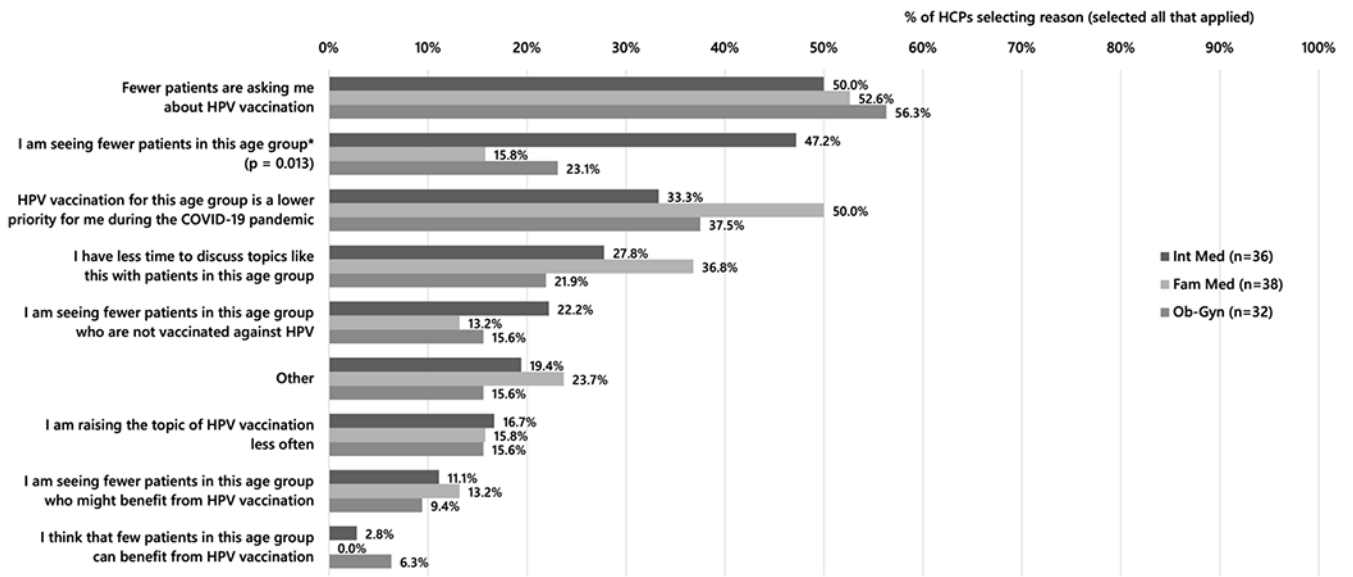


Figure 2. Reasons provided by participating physicians reporting having fewer HPV vaccine shared clinical decision-making discussions in the past year, June, 2021 (N=106)
 Abbreviations: HPV—Human papillomavirus; HCP, health care provider
 Note: The asterisk symbol indicates a result with statistically different results by specialty (p-value follows in parentheses)

Table 1.

Characteristics of participating physicians by practice specialty, June, 2021

	All Respondents (N=753) n (%)	Internal Medicine (N=251) n (%)	Family Medicine (N=249) n (%)	Obstetrics/Gynecology (N=253) n (%)
Gender				
Male	471 (62.5%)	174 (69.3%)	159 (63.9%)	138 (54.5%)
Female	276 (36.7%)	74 (29.5%)	89 (35.7%)	113 (44.7%)
Other*	6 (0.8%)	3 (1.2%)	1 (0.4%)	2 (0.8%)
Race/ethnicity (combined)				
White, non-Hispanic	528 (70.1%)	157 (62.5%)	173 (69.5%)	198 (78.3%)
Black, non-Hispanic	29 (3.9%)	9 (3.6%)	14 (5.6%)	6 (2.4%)
Hispanic	36 (4.8%)	16 (6.4%)	6 (2.4%)	14 (5.5%)
Other, non-Hispanic	158 (21.0%)	69 (27.5%)	55 (22.1%)	34 (13.4%)
Did not answer	2 (0.3%)	0	1 (0.4%)	1 (0.4%)
Age, mean years (SD)	52.7 (9.7)	51.4 (9.7)	52.8 (9.4)	53.8 (9.8)
U.S. region				
Northeast	163 (21.6%)	59 (23.5%)	34 (13.7%)	70 (27.7%)
Midwest	206 (27.4%)	59 (23.5%)	87 (34.9%)	60 (23.7%)
South	231 (30.7%)	75 (29.9%)	77 (30.9%)	79 (31.2%)
West	153 (20.3%)	58 (23.1%)	51 (20.5%)	44 (17.4%)
Private practice	543 (72.1%)	185 (73.7%)	182 (73.1%)	176 (69.6%)
>10% patients uninsured	123 (16.3%)	43 (17.1%)	43 (17.3%)	37 (14.6%)

* Other gender includes transgender, other gender identity, or did not answer. These responses were combined to avoid cell sizes of 1.

Abbreviations: U.S.—United States; SD = standard deviation

Table 2.

Self-reported awareness of HPV vaccination recommendations and comfort with SCDM among participating physicians by practice specialty, June, 2021

	All Respondents (N=753) n (%)	Internal Medicine (N=251) n (%)	Family Medicine (N=249) n (%)	Obstetrics/ Gynecology (N=253) n (%)	p-value
Aware of catch-up HPV vaccination recommendation for persons through age 26 years	699 (92.8%)	227 (90.4%)	229 (92.0%)	243 (96.1%)	0.07
Aware of SCDM regarding HPV vaccination for some adults patients aged 27–45 years	600 (79.7%)	185 (73.7%)	187 (75.1%)	228 (90.1%)	<0.01
Know what points to emphasize in a SCDM discussion about HPV vaccination (strongly or somewhat agree) *	541 (90.2%)	169 (91.4%)	168 (89.8%)	204 (89.5%)	0.80
Know with whom should be having SCDM discussions about HPV vaccination (strongly or somewhat agree) *	543 (90.5%)	171 (92.4%)	172 (92.0%)	200 (87.7%)	0.19
Change in number of HPV vaccination SCDM discussions over last 12 months					
More	325 (43.2%)	90 (35.9%)	99 (39.8%)	136 (53.8%)	<0.01
Same	322 (42.8%)	125 (49.8%)	112 (45.0%)	85 (33.6%)	<0.01
Less	106 (14.1%)	36 (14.3%)	38 (15.3%)	32 (12.7%)	0.69

* This analysis is restricted to those respondents who were aware of the recommendation for shared clinical decision making for some patients aged 27–45 years.

Abbreviations: HPV—Human papillomavirus; SCDM—Shared clinical decision-making

Table 3. HPV vaccination objective knowledge items and responses among participating physicians by practice specialty, June, 2021

Knowledge Item	Correct Response*	Answered correctly, N (%)				p-value
		Overall (N=753) [†] n (%)	Internal Medicine (N=251) n (%)	Family Medicine (N=249) n (%)	Obstetrics/ Gynecology (N=253) n (%)	
1. Three doses of HPV vaccine are recommended for a person who starts the HPV vaccination series at age 15 years or older.	True	535 (71.3%)	162 (64.5%)	183 (73.8%)	190 (75.7%)	0.01
2. A person who previously received one dose of bivalent or quadrivalent HPV vaccine can complete the recommended HPV vaccination series with a 9-valent HPV vaccine.	True	522 (69.3%)	159 (63.3%)	168 (67.7%)	195 (77.7%)	0.003
3. A clinical antibody test should be used to decide whether HPV vaccination might be beneficial, by determining whether a person is already immune to any given HPV type.	False	547 (72.6%)	150 (59.8%)	180 (72.3%)	217 (86.5%)	<0.001
4. HPV vaccination will not prevent progression of HPV infection to disease, decrease time to clear an HPV infection, or treat HPV-related disease for an existing HPV infection.	True	337 (44.9%)	110 (43.8%)	104 (41.9%)	123 (49.0%)	0.31
5. A person who has a new sex partner may be at risk of acquiring a new HPV infection.	True	734 (97.9%)	240 (95.6%)	244 (98.4%)	250 (99.6%)	0.036
6. A prior HPV infection is a contraindication to HPV vaccination.	False	677 (89.9%)	209 (83.3%)	227 (91.5%)	241 (96.0%)	<0.001
7. ACIP recommends HPV vaccination for everyone aged 27–45 years.	False	372 (49.4%)	112 (44.6%)	135 (54.4%)	125 (49.8%)	0.10
8. Effectiveness of HPV vaccination is much higher when given at the recommended age for routine vaccination (i.e., 11 or 12 years) than when given at age 27–45 years.	True	491 (65.2%)	152 (60.6%)	161 (64.9%)	178 (70.9%)	0.07
Total number of correct answers, mean (SD)	N/A	5.6 (1.5)	5.2 (1.5)	5.6 (1.5)	6.0 (1.4)	<0.01

* Response options were: True, False, Don't know.

[†]Note that the denominator varies (744–753) because not all people responded to each question. The denominators by specialty are as follows: internal medicine was 248-251, family medicine was 246-249, and obstetrics/gynecology was 250-253.

Abbreviations: ACIP—Advisory Committee on Immunization Practices; HPV—Human papillomavirus