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Original Study

Obstetrician-gynecologists and the HPV Vaccine: Practice Patterns, Beliefs, and Knowledge

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Abstract. *Study Objective:* Human papillomavirus (HPV), the most common sexually transmitted infection in the United States, can be contracted by young girls shortly after sexual debut. Human papillomavirus can lead to cervical and anogenital cancers and genital warts. A vaccine has been developed to protect against precancerous lesions. We examined obstetrician-gynecologists' practices, opinions, and knowledge regarding this vaccine.

Design: A 37-item questionnaire was sent out by the American College of Obstetricians and Gynecologists (ACOG) to its fellows and junior fellows between May and November of 2007.

Participants: Surveys went to 3896 fellows and junior fellows of ACOG. Of these surveys, 771 were Collaborative Ambulatory Research Network (CARN) members who have volunteered to receive several surveys per year. The remaining 3125 questionnaires were sent to all fellows and junior fellows in ACOG's District V (Ohio, Kentucky, Indiana, Michigan and Ontario, Canada). Response rates were 51.0% and 30.7% for CARN and District V, respectively.

Results: Of those who administer vaccines, most offer the HPV vaccine. Most know this vaccine protects against 4 HPV types. Fewer knew the percentages of cervical cancers and genital warts prevented. Over 20% knew all 3 answers. Only a minority answered all incorrectly. Approximately 15% view HPV vaccine as safe in pregnancy. Many agree cost is a reason for patient refusal and a deterrent from mandating the vaccine.

Conclusion: Obstetrician-gynecologists are knowledgeable of the HPV vaccine and are incorporating it into practice. Financial concerns may limit widespread immunization.

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Introduction

Human papillomavirus (HPV) infects approximately 6.2 million people each year and is the most common sexually transmitted infection in the United States (US).[1] Some HPV infections are cleared from the body within 1 to 2 years, but persistent infections of high-risk forms have negative health consequences,[1,2,3] including cervical and anogenital cancers and genital warts. High-risk HPV types are present in 99% of cervical cancers.[4]

The American Cancer Society estimated that in the US in 2007, there would be 11,150 new cases of invasive cervical cancer and 3670 related deaths.[5] The primary prevention of cervical cancer is detection of abnormal cervical cytology, via Pap tests and cervical exams. But now, in addition to screening, women can be protected by early vaccination against HPV, which has long been associated with cervical cancer.[6]

Exposure to HPV within a few years of first sexual contact is common.[7] which is important to consider in light of reports that many adolescents are sexually active.[2,8,9] For example, Martin and colleagues found that nearly 14% of sixth-grade girls and 50% of high school sophomores were sexually active.[9] One study found that more than one-third of female college students were infected within 2 years of their first sexual intercourse.[10] Winer and colleagues investigated women who had not yet had their first intercourse experience or who had become sexually active in the 3 months prior to the study and found that the 1-year cumulative incidence of the first HPV infection was 28.5%, which increased to nearly 50% after 3 years.[11]

Human papillomavirus is most prevalent in women aged 20 to 24 years, and an estimated 80% of sexually active individuals have been infected with at least 1 type of HPV by 50 years of age.[7]

In 2006, the quadrivalent HPV vaccine Gardasil was approved in the US for use in females between 9 and 26 years of age. Evidence from clinical trials performed by the Females United to Unilaterally Reduce Endo/Ectocervical Disease (FUTURE) investigators indicates that this vaccine protects against HPV types 6 and 11, which are associated with genital warts, as well as types 16 and 18, which are associated with 70% of cervical cancers.[1,12,13] The vaccine was shown to be effective in protecting against precancerous lesions on the cervix, vulva, and vagina.[14]

Barriers to the widespread use of the HPV vaccine include: a lack of knowledge among the US public regarding HPV; parental concerns regarding vaccination, cost, as well as whether the vaccine will be financed by the government and insurers; challenges related to adolescent health care-seeking behavior, and the multiple dosages required for administration.[15,16,17] Another common barrier to HPV vaccination is the fact that HPV is sexually transmitted. Several studies have reported that the proposition of vaccinating young girls for a sexually transmitted infection was not readily accepted and raised that concern that the vaccine might encourage girls to be promiscuous.[18,19,20] However, some research has shown that the sexually transmitted nature of HPV may not be a significant obstacle to HPV vaccine acceptance.[21]

One issue that is relevant to the administration of the HPV vaccine is physician knowledge of HPV. Riedesel and colleagues also found that improving physician knowledge was a modifiable predictor of intention to vaccinate patients.[22] Thus, the widespread implementation of the HPV vaccine depends on physicians being knowledgeable about the disease itself. However, there is evidence that there is a deficit in this area.[23,24] One study of Canadian obstetrician-gynecologists, family physicians, and pediatricians[25] found that obstetrician-gynecologists demonstrated the highest levels of knowledge regarding HPV, although the study concluded that overall knowledge of HPV and its prevention was poor. Along similar lines, Herzog et al also found that out of American obstetrician-gynecologists, primary care physicians, and pediatricians, obstetrician-gynecologists were the most knowledgeable of which HPV types are associated with different diseases.[26]

Obstetrician-gynecologists can play a significant part in the widespread administration of the HPV vaccine.[27] Prior to the HPV vaccine's release, it was shown that professional society recommendation would be important for the acceptability of a potential HPV vaccine.[28] Since the vaccine's release, the American College of Obstetricians and Gynecologists has recommended the use of this vaccine[27]; thus, it is of interest to examine the HPV-related practice patterns, opinions, and knowledge of obstetrician-gynecologists in this postlicensing period. In this study, we looked at the knowledge, beliefs, and administration of the HPV vaccine as 1 example of a gynecologic-relevant immunization practice.

Materials and Methods

Sample

Questionnaire surveys were sent out by the American College of Obstetricians and Gynecologists (ACOG) between May and November of 2007. A cover letter was enclosed stating that return of a completed questionnaire would constitute informed consent to participate in the study.

Surveys were sent to a total of 3896 ACOG fellows. Of these surveys, 771 were sent to members of the Collaborative Ambulatory Research Network (CARN). Members of CARN are practicing obstetrician-gynecologists who have volunteered to complete 5 to 6 survey studies per year. The remaining 3125 surveys were sent to non-CARN Fellows of ACOG's District V, which includes physicians in Indiana, Kentucky, Ohio, Michigan, and Ontario, Canada. There are members of CARN who practice in District V. Given that our aim was to compare the 2 groups, those who overlapped on both lists were taken out and were used only in the CARN data. We again checked for the presence of overlap during data entry. To benefit from having both national (CARN) and specific local (District V) samples, two samples were used. Collaborative Ambulatory Research Network members from District V were excluded from the CARN sample.

Initial District V mailings were sent in May 2007, and CARN mailings were sent in June 2007. Those who did not respond were sent 4 reminder mailings. Response rates for surveys mailed to CARN members typically exceed 50%, and response rates for surveys mailed to non-CARN Fellows typically average 30%. Half of the nonrespondents (n = 1043) from District V received an abbreviated survey that was mailed out in November 2007 to test if those who responded were representative of District V as a whole. Questionnaires returned by December 19, 2007 were included in data analyses.

Analyses included only the surveys of respondents who indicated they were currently practicing. Individuals in District V who indicated they practiced outside of its 4 US states and 1 Canadian province were excluded. Doing so brought the number of CARN respondents from 396 to 390 and the number of District V respondents from 974 to 952, resulting in

response rates of 50.6% and 30.5%, respectively. The brief letter in District V yielded 316 responses, 295 of whom were currently practicing, resulting in a 28.3% response rate for that specific mailing. To determine the sufficient sample size, we used the most restricting test (chi-square) at the highest degrees of freedom (4) according to Cohen.[29] At power = 0.8, medium effect size at 0.3, and $P < .05$, the appropriate sample size is 133, which we exceeded.

Survey

To validate our 37-question survey, it was pilot-tested on 20 obstetrician-gynecologists at a local university hospital. The survey consisted of 5 sections: (1) a series of items regarding the respondents' demographic characteristics and those of their patient populations; (2) practices regarding vaccination; (3) practice, knowledge, and beliefs specifically regarding the HPV vaccine; (4) beliefs and knowledge regarding other vaccines, such as the influenza vaccine; and (5) background information regarding their view of immunization education in medical school and residency, as well as their views on what would help improve their ability to administer vaccines and disseminate knowledge of immunization to patients and clinicians. Data on non-HPV vaccines will be published elsewhere.

We assessed knowledge of Gardasil's protective effects. Respondents filled in the following: *''Gardasil protects against ____ forms of HPV that cause ____% of cervical cancer and ____% of genital warts.''* Each blank section of the statement was scored separately, and these blanks were scored as correct if the physician had filled in the exact number. The correct answers are 4, 70, and 90, respectively.

In addition to the question above, the abbreviated survey included several opinion, knowledge, and practice questions from the larger survey. This survey was composed of only 12 questions.

Data Analysis

Data were analyzed using a personal computer-based version of SPSS, version 15.0 (SPSS Inc. Chicago, IL). Data from the 3 samples were analyzed separately. Descriptive and frequency data were computed for primary analysis.

For χ^2 tests with medical school graduation year, as a factor we created 3 approximately equally sized groups: before 1983, between 1983 and 1992, and after 1992. For instances where graduation year may have played a part in our results, we statistically controlled for gender, and vice versa. Analyses were done using analysis of variance (ANOVA) and χ^2 tests. Significance was evaluated at $P \leq .05$, and confidence intervals were 95%.

Comparisons were made between the District V and CARN groups. Because the groups did not differ on many variables, significant differences are mentioned only where such differences occurred. Finally, District V respondents were compared with District V nonrespondents to determine if those who responded were representative of their district as a whole, which seems to be the case.

Results

District V

Nearly half (48.8%) of respondents from District V were female. The median medical school graduation year was 1988 (standard deviation [SD] = 10.2). Female physicians graduated from medical school an average of 9.34 years after males (t [925] = 15.6, $P < .001$). Of the 5 geographic areas within ACOG's Distrtict V, 33.8% of the respondents were from Ohio, and 30.1%, 18.3%, 12.6%, and 4.6% were from Michigan, Indiana, Kentucky, and Ontario, Canada, respectively. A majority primarily practices general obstetrics and gynecology (74.6%). More detailed information regarding demographics and practice patterns are depicted in Table 1. Patient populations are predominantly Caucasian, with a mean of 71.9% (SD = 21.5%) of patients being white.

Table 2 depicts information regarding the care provided to specific patient populations. Almost all District V respondents (95.9%) provide some form of care (ie, gynecologic, obstetric, or primary) to adolescents, and 99.8% treat women of childbearing age. Approximately one-third of respondents (34.8%) indicated that they provide some form of primary care to at least 1 age group.

Males who graduated medical school prior to 1983 were less likely than more recent graduates to indicate that they administer vaccines ($\chi^2[2] = 15.3$, $P < .001$). This was also a trend in females, though not significant ($\chi^2[2] = 5.2$, $P = .08$). Almost all (92.4%) obstetrician-gynecologists had heard of the quadrivalent HPV vaccine. Only 15.4% indicated that it was safe to administer the HPV vaccine during pregnancy.

Physicians were asked to complete the following statement: *''Gardasil protects against ____ forms of HPV that cause ____% of cervical cancer and ____% of genital warts.''* These results are depicted in Table 3. Those who correctly filled in all 3 blanks regarding the protective effects of Gardasil were more likely to give vaccines in their offices (χ^2 [1] = 7.9, $P = .01$).

Among those who give vaccines (77.3%), 87.6% administer the HPV vaccine. Of those individuals who offer only 1 vaccine in their offices (21.7%), most (85.5%) said that 1 vaccine was the HPV

Table 1. Demographic Information and Practice Patterns District V and CARN

	District V (%)	CARN (%)
Sex		
Male	51.2	50.6
Female	48.8	49.4
Primary practice		
General Ob/Gyn	74.6	77.9
Gynecology only	12.6	11.8
Other	7.2	5.1
Maternal/fetal medicine	5.3	4.9
Obstetrics only	0.3	0.3
Current practice		
Solo private practice	20.2	19.3
Large group (4+ partners)	33.2	24.7
Other	15.8[b]	24.8[b]
1 partner	7.3	7.5
University full-time faculty and practice	8.9	12.4
Small group (2 or 3 partners)	14.7	11.3
Location		
Urban/inner-city	11	11.5
Urban/not inner-city	31	38.1
Rural	17.3	15
Military	0.2[a]	1[a]
Suburban	40.5	34.4

Abbreviation: CARN, Collaborative Ambulatory Research Network.
[a]$P \leq .05$
[b]$P < .001$

vaccine. Respondents who provide the HPV vaccine administer an average of 13.2 (SD = 14.8) each month.

Most respondents (76.7%) indicated that they assess the need for the HPV vaccine with gynecologic patients; of these, 78.9% indicated that they would give the vaccine, 12.9% would refer the patient elsewhere, and 3.6% would take another course of action, such as writing a prescription or checking insurance coverage.

About half of the respondents (50.3%) indicated they assess the need for the HPV vaccine with their obstetrics patients. When asked what they recommend after assessment, most (83.1%) would delay vaccination until postpartum, 2.1% would administer it, 10.6% would refer, and 1.3% would take some other action.

Physicians' opinions as to the actual reasons patients refused the vaccine when offered are shown in Table 4. Almost all (90.3%) indicated that they agreed or strongly agreed that the cost of the vaccine was the reason their patients refused it. The next most chosen reason for patient refusal was that patients did not feel as though they were at risk for HPV (with 53.8% of respondents agreeing or strongly agreeing).

Physicians' levels of agreement with mandating the HPV vaccine are depicted in Table 5. Women agreed more strongly with mandating the vaccine ($\chi^2[2] = 6.9$, $P = .03$). Table 6 depicts the percentage of physicians who agreed or disagreed with various reasons *not* to mandate the vaccine. Financial cost to the patient was by far the top reason not to mandate (71.2% indicating they agree or strongly agree). After cost to the patient, lack of reimbursement was the next most agreed with reason to not mandate the vaccine (38.5% agreed or strongly agreed).

District V, Brief Letter Responders

There were few differences between District V responders and responders to the abbreviated letter. Fewer females responded to the letter than to the survey ($\chi^2[1] = 6.1$, $P = .01$). Letter responders had a mean medical school graduation year of 1987 (SD = 10.6).

The only difference in their responses to the survey questions is that District V members were more likely than letter responders to agree or strongly agree that financial cost ($\chi^2[4] = 16.2$, $P = .003$) and reimbursement to the physician ($\chi^2[4] = 31.2$, $P < .001$) were reasons not to mandate the vaccine. Table 6 depicts which reasons were agreed or strongly agreed with as to why the vaccine should *not* be mandated.

Collaborative Ambulatory Research Network

Collaborative Ambulatory Research Network demographics are displayed in Table 1. The second set of results involves CARN members, a group that has agreed to participate in ACOG research and that are representative of all ACOG fellows across all ACOG districts. Nearly half (49.4%) of respondents were female. Respondents had a median medical school graduation year of 1987 (SD = 10.4). Female physicians graduated medical school an average of 8.4 years later than males ($t[381] = 7.9$, $P < .001$). A majority of respondents practice primarily general obstetrics and gynecology (77.9%).

Table 2. Patient Population Age Ranges and Care Provided for District V Respondents

Patient Population and Care Provided	District V (%)	CARN (%)
Adolescents: gynecology	85.2	87.4
Adolescents: obtetrics	71.2	71.8
Adolescents: primary care	19.6	24.4
Adolescents: do not treat	4.1	2.6
Women of childbearing age: gynecology	93.4	94.1
Women of childbearing age: obstetrics	80.8	83.3
Women of childbearing age: primary care	34.1[a]	40.5[a]
Women of childbearing age: do not treat	0.2	0
Postmenopausal women: gynecology	91.5	92.3
Postmenopausal women: primary care	25.2[a]	30.8[a]
Postmenopausal women: do not treat	3.6	2.6

Abbreviation: CARN, Collaborative Ambulatory Research Network.
[a]$P \leq .05$

Table 3. District V and CARN Responses Regarding the Statement *''Gardasil protects against _ forms of HPV that cause _% of cervical cancer and _% of genital warts.''*

	% District V	% CARN
Correct number of forms of HPV (4)	91.50	88.40
Correct percentage of cervical cancers (70%)	46.60	40.60
Correct percentage of genital cancers (90%)	46.20	41.80
All 3 blanks filled correctly	29.4[a]	22.9[a]
All 3 blanks filled incorrectly	4.20	6.40

Abbreviation: CARN, Collaborative Ambulatory Research Network.
[a]$P < .05$

Patient populations are predominantly Caucasian, with CARN respondents indicating a mean of 62.5% (SD = 24.7%) of their patients being white. Table 2 depicts information regarding the care provided to specific patient age groups. Most physicians indicated that they provide some form of treatment to adolescents (97.4%) and women of childbearing age (99.9%). Most respondents (94.2%) had heard of the quadrivalent HPV vaccine. Only 15.9% indicated that it was safe to administer the HPV vaccine during pregnancy.

Table 3 depicts the results regarding the fill-in statement concerning the protective effects of the HPV vaccine. Unlike the pattern demonstrated in District V, for the CARN group there was no relationship between respondents' knowledge of HPV's protective effects and whether or not they administer vaccines in their office.

Similar to District V, a majority of CARN respondents (79.7%) indicated that they administer vaccines in their office, 91.0% of whom administer the HPV vaccine. As in District V, of those CARN members who indicated they administer only 1 vaccine (18.2%), most (84.5%) of respondents indicated that 1 vaccine is the HPV vaccine. Those who offer the HPV vaccine reported administering an average of 20.6 (SD = 28.0) vaccines each month.

For obstetrics patients, over half (52.6%) of respondents indicated they assess the need for the HPV vaccine. Of those who assess obstetrics patients' need for the HPV vaccine, most would wait until postpartum to vaccinate (86.8%), 9.3% would refer, 2.4% would administer the vaccine, and 1.5% would take some other action.

For gynecologic patients, most (81.8%) indicated that they assess the need for the HPV vaccine. Of those who indicated that they assess the need for the HPV vaccine in gynecologic patients, 82.4% would give the vaccine, 12.9% would refer, and 0.6% would take another course of action.

Most (83.9%) respondents indicated that they agreed or strongly agreed that cost was a reason for patient refusal of the HPV vaccine. The next strongest reason for patient refusal was that patients did not feel as though they were at risk for HPV (54.0% agreed or strongly agreed). Table 4 depicts physicians' beliefs as to why the patients refused the vaccine when it was offered.

Table 4. District V and CARN Physicians' Beliefs as to Why Their Patients Refuse the HPV Vaccine

District V	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
Financial cost of the vaccine[a]	53.2	37.1	5.1	2.9	1.7
Are currently pregnant	11.8	35.3	30.4	14.2	8.2
Do not feel as though they are at risk	10.1	43.7	19.1	18.8	8.4
Have already been diagnosed with HPV	9.3	38.6	21.3	21.6	9.2
Do not feel the efficacy of the HPV vaccine has been proven	8.9	29.4	23.0	25.7	13.1
Have already been vaccinated for HPV	7.1	13.7	26.5	30.5	22.1
Religious reasons	6.3	19.4	25.3	29.7	19.3
Do not agree with vaccination in general	5.3	25.4	26.3	30.8	12.2
Medical reasons[a]	2.2	15.7	25.9	37.1	19.1
CARN	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
Financial cost of the vaccine[a]	42.8	41.1	8.8	2.6	4.7
Are currently pregnant	13.0	35.2	26.9	13.0	12.0
Do not feel as though they are at risk	12.8	41.2	19.9	18.7	7.4
Have already been diagnosed with HPV	9.1	38.8	22.1	20.3	9.7
Have already been vaccinated for HPV	7.9	15.2	26.1	27.3	23.6
Do not feel the efficacy of the HPV vaccine has been proven	6.2	25.2	24.0	31.5	13.1
Religious reasons	5.7	19.2	26.0	27.2	21.9
Do not agree with vaccination in general	6.2	22.8	24.3	31.5	15.1
Medical reasons[a]	0.6	9.6	31.8	36.3	21.6

Abbreviation: CARN, Collaborative Ambulatory Research Network.
[a]$P < .05$

Table 5. District V and CARN Physicians' Level of Agreement with Mandating the HPV Vaccine

	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
District V	12.50	27.30	14.00	30.90	15.30
CARN	11.80	22.60	18.30	30.40	16.80

Abbreviation: CARN, Collaborative Ambulatory Research Network.

Table 5 depicts how strongly respondents feel that the HPV vaccine should be mandated, and Table 6 depicts the percentage of physicians who agreed or strongly agreed with various reasons *not* to mandate the vaccine. Nearly two-thirds (65.9%) agreed or strongly agreed that cost was a reason not to mandate the HPV vaccine.

Differences between District V and CARN Respondents

We compared our study's 2 main groups on all questions and found that our regional sample did not differ from our national sample on many fronts. A larger proportion of CARN respondents (40.5%) indicated they provide primary care for women of childbearing age than do District V physicians (34.1%) ($\chi^2[1] = 5.05$, $P = .03$). Collaborative Ambulatory Research Network (42.3%) was more likely than District V (34.8%) to provide primary care to at least 1 age group ($\chi^2[1] = 7.0$, $P = .008$). Collaborative Ambulatory Research Network also treats a lower percentage of Caucasian patients (M = 62.5%) than does District V (M = 71.9%) (t[1287] = 6.8, $P < .001$).

Collaborative Ambulatory Research Network respondents reported administering a higher average number of HPV vaccines each month (20.6) than District V (13.2) ($t[799] = 4.8$, $P < .001$). A larger proportion of CARN respondents (76.7%) indicated that they assess the need for the HPV vaccine in gynecologic patients than District V (81.8%) ($\chi^2[1] = 1.3$, $P = .04$). Fewer CARN responders (22.9%) filled in all 3 blanks correctly than District V (29.4%) ($\chi^2[1] = 5.1$, $P = .02$).

Respondents from District V (38.5%) were more likely than those from CARN to agree or strongly agree with reimbursement to the physician as a reason not to mandate the HPV vaccine (25.9%) ($\chi^2[4] = 10.4$, $P = .03$). District V respondents (90.3%) were more likely than CARN members (83.9%) to agree or strongly agree that cost was a reason for patient refusal of the HPV vaccine ($\chi^2[1] = 9.0$, $P = .003$). A larger proportion of respondents from District V (17.9%) agreed or strongly agreed with medical reasons for patient refusal than CARN respondents (10.2%) ($\chi^2[1] = 10.5$, $P = .001$).

Table 6. Percentage of Physicians Who Agree or Strongly Agree with Various Reasons Why the HPV Vaccine Should NOT Be Mandated

	District V (%)	Letter Responders (%)	CARN (%)
Financial cost to the patient	71.2[a,b]	61.3[a]	65.9[b]
Lack of reimbursement to physician	38.5[c]	25.9[c]	35.2
Do not agree with any mandated vaccinations	30.9	38.5	30.2
Not enough research has been done	15.5	13.0	12.5
Has not been proven safe or effective	11.9	8.2	9.1
Do not agree with vaccination at all	1.5	1.5	1.9

Abbreviation: CARN, Collaborative Ambulatory Research Network.
[a]District V members and nonresponders differed, $P = .003$.
[b]District V members and CARN members differed, $P = .03$.
[c]District V members and nonresponders differed, $P < .001$.

Discussion

Human papillomavirus, the most common sexually transmitted infection in the US, can lead to genital warts and anogenital cancers. The HPV vaccine has been shown to provide significant protection against these consequences, a breakthrough that has been aggressively advertised in commercials that urge young girls to be "one less" woman with cervical cancer. In sexually naïve females, there was an efficacy of nearly 100% against all grades of cervical intraepithelial neoplasia and adenocarcinoma in situ related to vaccine HPV types.[30] The HPV vaccine is particularly relevant to obstetric-gynecological care. Less than 10% indicated they do not offer this vaccine; because the HPV vaccine is related to gynecologic care and has been accepted by most respondents, this may open the door to providing additional primary care vaccines, such as influenza.

Despite its recent release, physicians are well informed about the HPV vaccine. Few respondents indicated that they had not heard of the quadrivalent HPV vaccine. Most physicians knew against how many forms of HPV the vaccine prevents, though fewer respondents correctly answered questions about the percentage of cervical cancers and genital warts against which the vaccine protects. This result may have been aided by our referring to the vaccine as the quadrivalent HPV vaccine, or the fact that there was no margin of error allowed in reporting the percentages of warts and cancers protected against.

A majority of respondents who assess the need for this vaccine in pregnancy wait to administer it postpartum. Only about 15% of respondents indicated the HPV vaccine is safe in pregnancy, though

administration is not recommended owing to a lack of data.[1,7] Together these results indicate that although obstetrician-gynecologists are knowledgeable about the HPV vaccine, there are some knowledge gaps that need to be narrowed.

Although most physicians have some knowledge of the protective effects of the quadrivalent HPV vaccine, District V members were more likely than CARN to accurately fill in all 3 blanks in the knowledge statement. In District V, respondents who accurately responded to questions regarding the protective effects of the HPV vaccine were more likely to administer vaccines in their office. This trend did not exist within CARN, possibly because CARN members are research volunteers and may have more interest in research, including research on the HPV vaccine, regardless of whether they administer it or not.

It has been shown that physician recommendation influences patient acceptance of the HPV vaccine.[31] However, respondents indicated that between 15% and 20% of their patients refused the vaccine, most indicating financial cost as a factor. This finding is supported by a recent study that found that a third of physicians identified cost as a barrier to patient acceptance of the HPV vaccine.[32]

Approximately half of respondents agreed that some of their patients refused the vaccine because they had been diagnosed with HPV. It is important for physicians to discuss the quadrivalent protections of the HPV vaccine with those who have been diagnosed with HPV, as there still may be some protective benefit. The vaccine protects women against infections of HPV types to which they have not been exposed,[13] which is significant because the risk of new HPV infections in previously exposed women is greater than for uninfected women.[33-36]

There was no strong majority that either agreed or disagreed with mandating the HPV vaccine for everyone; however, a majority of respondents indicated that cost was a reason not to mandate the vaccine. This finding indicates that if the HPV vaccine continues to enter the mainstream and be covered by more insurance providers, physicians' views of mandating the HPV vaccine may change. It may also change if more states require this vaccine for school entry. As of now, only 3 states, Virginia, New Jersey, and Texas, have enacted a mandate.[26,37] However, Virginia has a parental opt-out clause, and the legality of Texas's mandate via executive order has been questioned.[37]

This research has the benefit of investigating actual physician knowledge, attitudes, and beliefs in the postlicensing period, whereas much of the existing literature examines hypothetical beliefs prior to the approval of the HPV vaccine. Our research also highlights knowledge of the HPV vaccine, whereas much of the literature refers to knowledge about HPV infection. This study also has data from both regional and national groups; however, there are limitations to our study. All surveys were filled out retrospectively, possibly subjecting responses to errors of recall. Our investigation into why patients refuse the HPV vaccine may not be an accurate reflection, because we are relying on physicians to infer their patients' beliefs. Another limitation of our survey is that we did not specifically ask physicians to respond to questions based on patients of a certain age range. Given that the HPV vaccine is approved for 9- to 26-year-olds, it was intended that physicians would respond accordingly. For the specific question regarding mandating the vaccine, it was assumed that responses would be based on school-aged females, as mandated vaccines are school requirements and not enforced in any other age group. However, the lack of an explicit age range may have led some respondents to interpret the question more broadly. Additionally, the response rate of 30.7% for District V is somewhat low. This rate raises the concern that District V nonrespondents differ from respondents. The fact that abbreviated letter responders gave similar responses to those who filled out the full survey somewhat mitigates this concern; however, the letter responders represent only about 15% of the physicians who did not return the full-length survey, so we cannot definitively address this concern.

This study is one of the first to measure physician practices regarding the HPV vaccine since its approval in the US. Our results show that the majority of physicians assess the need for and offer the HPV vaccine during gynecologic practice. We also found that 20% of respondents offer only the HPV vaccine and no others. This finding indicates that this vaccine is particularly relevant to obstetric and gynecologic practice and may also open the door for this specialty to provide more general vaccines, such as the influenza vaccine.

Despite differences on a few points, the similarities between the 3 groups (CARN, District V, and District V Brief Letter Responders) support that these results represent national trends. Obstetrician-gynecologists are knowledgeable of the HPV vaccine and its protective effects, and many have adopted it into their practice. Results indicate cost may be the greatest barrier to the widespread administration and mandating of the HPV vaccine. However, this obstacle may be overcome as insurance coverage for this vaccine increases. Future research should focus on evaluating the impact of physician bias. Additionally, the patterns found in these respondents may be exclusive to obstetrician-gynecologists; primary care physicians, internists, family doctors, and other health care providers should be studied to determine broader trends regarding the HPV vaccine that exist throughout the medical field.

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