

Survey article

Gynecologic oncology HPV vaccination practice patterns: Investigating practice barriers, knowledge gaps and opportunities for maximizing cervical cancer prevention

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ABSTRACT

Objective: HPV vaccination is an important form of cancer prevention. Gynecologic oncologists have an opportunity to improve adult vaccination rates. We aimed to describe current HPV vaccination practices and barriers to vaccination reported by gynecologic oncologists.

Methods: An online survey was developed, pilot tested and sent to U.S. members of the Society of Gynecologic Oncology.

Results: Of the 226 respondents, most were female (73%), ≤ 45 years old (64%) and practiced in urban (60%) and academic settings (69%). Ninety percent had recommended the HPV vaccine in the past year. Nearly half (47%) had facilitated vaccination by: administering the HPV vaccine in clinic (40%), stocking the vaccine (35%), or prescribing the vaccine (30%). Recommending the vaccine was associated with higher outpatient volume, practicing in the South vs. Northeast, and having higher levels of vaccine knowledge.

Of the 90% who recommended the vaccine, 60% did not prescribe or know if they could prescribe the vaccine in their state. Prioritization of cancer treatment was the most commonly reported barrier to HPV vaccination (88%). Approximately half of providers reported other systems-level hinderances such as high cost of stocking the vaccine, clinic flow disruption, or uncertainty surrounding insurance coverage. Almost all recommenders offered the vaccine at HPV-related dysplasia (92%) or cancer (80%) visits, while only 24–50% offered it at non-HPV-related visits.

Conclusions: These survey results identify patient, provider, and systems-level barriers that could be targeted to help increase adult HPV vaccination in gynecologic oncology clinics.

1. Background

HPV vaccination can prevent over 90% of HPV related cancers, but vaccine uptake in the United States is suboptimal. In 2018, only 52.8% of females and 26.3% of males ages 19–26 had received at least one dose of the HPV vaccine (Lu et al., 2021; Meites et al., 2019). In 2018, the FDA expanded approval of the HPV vaccine to adults ages 27–45 (Administration USFaD, 2018). As a result, the American College of Obstetricians and Gynecologists (ACOG) supports joint decision-making for persons aged 27–45 years old (Meites et al., 2019; Human Papillomavirus Vaccination, 2020). In addition to the preventive benefits, HPV vaccination may be effective in reducing recurrence of HPV-related

cervical dysplasia, which may be particularly important for women in this age group (Lichter et al., 2020).

There have been many studies examining HPV vaccination knowledge, barriers and practices among pediatricians, family practitioners and general obstetrician/gynecologists (Ob/Gyns). However, the perspectives of gynecologic oncologists haven't been explored (Kasting et al., 2021; Dilley et al., 2018; Walling et al., 2019). Gynecologic oncologists treat patients with many conditions across the spectrum of HPV-related diseases and therefore play an important role in cancer prevention. Additionally, gynecologic oncologists see young women in consultation for conditions such as adnexal masses or fibroids, many of whom are eligible for the vaccine. Thus, they have the potential to

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impact HPV vaccination uptake.

We aimed to assess US gynecologic oncologists' knowledge about HPV vaccination as well as their vaccination practices and related barriers. These data could be leveraged to increase HPV vaccination in gynecologic oncology clinics.

2. Methods

2.1. Survey development

This was an IRB approved survey study of gynecologic oncologists practicing in the United States. We developed an anonymous online survey to collect participant demographics and characteristics of their outpatient practice (i.e. practice setting type, region, weekly outpatient volume, presence of dedicated clinic time for dysplasia and/or colposcopy procedures). We specifically queried four topic areas. First, we asked about past HPV vaccine recommendation and administration practices. We asked respondents if they had ever recommended the HPV vaccine in the last year *and* if they facilitated vaccination in one or more of the following ways: prescribing, stocking, and/or administering the vaccine in their clinic. Second, we asked about commonly reported and previously published barriers to HPV vaccine recommendation or administration (Kasting et al., 2021; Walling et al., 2019). Third, we assessed HPV vaccine knowledge by developing 5 multiple-choice knowledge questions regarding the HPV vaccine, its efficacy, FDA approval, and recommended administration (Meites et al., 2019; Administration USFaD, 2018; Human Papillomavirus Vaccination, 2020). Finally, we asked the subset of providers who both recommended and facilitated vaccination in what clinical scenarios (both HPV-related and HPV-unrelated) they would offer the HPV vaccine.

We conducted cognitive interviews, an established survey-development technique (Willis and Artino, 2013), with 5 gynecologic oncologists from varying practices to ensure the understandability and applicability of the survey questions in the study population. The survey questions were additionally pilot tested through online completion and feedback from gynecologic oncologists at our institution in order to determine timing and comprehensibility. In its final iteration, the 48-item self-administered online survey typically took less than 10 min to complete (Supplement 1). Distribution of the IRB approved survey was facilitated through an internal list of all Society of Gynecologic Oncology (SGO) members in the U.S. at the time of sending.

2.2. Participants and procedures

An email invitation was sent in October 2020 with reminder emails 3 and 8 weeks later. The survey was closed to participation after 4 months. Participation was voluntary and anonymous. The survey was conducted online using the Research Electronic Data Capture (REDCap) platform hosted by Johns Hopkins University. The participants consented to the use of their anonymous responses for research purposes. We excluded respondents who were not practicing gynecologic oncologists.

2.3. Statistics

Questions asked on a 5-point Likert scale to assess frequency were dichotomized into infrequent (never, rare) and frequent (sometimes, very often, always). Responses of yes/no/sometimes were dichotomized into yes (yes/sometimes) and no (no). Questions asking the likelihood of a specific practice were dichotomized into likely (very likely/likely) and unlikely (very unlikely, unlikely). Correct responses to the 5 knowledge questions were summed to calculate a knowledge score (0–5), which was further dichotomized into “good knowledge” (score $\geq 3/5$) and “poor knowledge” (score $\leq 2/5$ correct).

Descriptive statistics were used to report demographics, practice characteristics, and HPV vaccination practices reported by the respondents. Univariate logistic regression was used to identify

respondent and practice characteristics associated with recommending the vaccine. The variable ‘outpatient visits per week’ was dichotomized around its median (<31 versus ≥ 31 patients per week). Odds ratios with 95% confidence intervals that excluded the null were considered statistically significant. Analyses were conducted using STATA version 15.0.

3. Results

Of the 256 respondents, 30 did not meet the inclusion criteria (26 generalist Ob/Gyns, 1 medical oncologist, 3 medical students). The remaining 226 gynecologic oncology providers who completed the survey represented 12% of invitations successfully sent (Goff and Kushner, 2020). The majority (88%, $n = 199$) were physicians (MD or DO) and the remaining 12% ($n = 27$) were advanced practice providers (e.g. Nurse Practitioners). Most respondents were female (73%, $n = 165$), ≤ 45 years old (64%, $n = 146$) and practicing in urban (60%, $n = 135$) and academic settings (69%, $n = 157$). Seventy-eight percent ($n = 177$) had completed training, and of these, 36% ($n = 82$) had been in practice for > 10 years. One fifth (22%, $n = 48$) had dedicated time for patients with dysplasia and/or colposcopy procedures (Table 1).

Overall, 90% ($n = 193$) of gynecologic oncologists had recommended the HPV vaccine in the past 12 months. Nearly half (47%) had facilitated vaccination in at least one of the following ways: administering the HPV vaccine in clinic (40%), stocking the vaccine (35%) or prescribing the vaccine (30%). Over half of recommenders (60%) did not prescribe or know if they could prescribe the vaccine in their state.

The most commonly reported barrier to successfully vaccinating patients against HPV was prioritization of patients' cancer diagnosis (88%). Other common barriers were lack of follow-through by the

Table 1
Demographic and practice characteristics of survey participants.

	N = 226	(%)
Provider Characteristics		
Age Range (in years)		
<40	114	(50%)
41–65	94	(42%)
>65	18	(8%)
Professional Degree		
Physician (MD, DO)	199	(88%)
Advanced Practice Provider	27	(12%)
Identified Gender		
Female	165	(73%)
Male	60	(27%)
Prefer not to say	1	(<1%)
Primary Practice Setting		
Academic	157	(69%)
Private	47	(21%)
Public, Military or Other	22	(10%)
Years in Practice		
Resident/Fellow	49	(22%)
0–10	95	(42%)
11–30	62	(27%)
>30	20	(9%)
Practice Characteristics		
Region of the US		
Northeast	59	(26%)
Midwest	55	(25%)
South	82	(36%)
West	30	(13%)
Practice Location		
Rural	19	(8%)
Urban	135	(60%)
Suburban	72	(32%)
Number of Outpatients Per Week		
<31	73	(33%)
31+	150	(67%)
Dedicated Colposcopy Clinic		
Yes	48	(22%)
No	175	(78%)

patient when the vaccine could not be administered in clinic (50%), patient declined (50%), patient's vaccine history was not asked (49%), cost to the clinic was too high (48%), clinic flow was disrupted (43%) or there was uncertainty about insurance coverage (43%) (Fig. 1).

Overall, 70% of respondents answered the majority of the knowledge questions correctly. Most survey respondents (99%) identified the correct CDC recommended vaccination initiation age range and 78% correctly selected the level of efficacy of the nonavalent HPV vaccine in preventing cervical cancer (Figure S1). Less than half (41%) knew which HPV vaccine is currently available in the U.S.

Of the subset of providers who both recommended and facilitated vaccination (47% of the respondents, $n = 101$). Nearly all (98%) reported that they would offer the vaccine in at least one of the hypothetical clinical scenarios queried (Fig. 2). Most (80%) affirmed they routinely offer the vaccine to unvaccinated women over age 26 and 58% would consider offering it outside of the FDA-approved age range. Almost all reported offering the vaccine to patients with HPV-related lower genital tract dysplasia (92%) or HPV-related cancer (80%) diagnoses. Eighty-five percent reported they offer the vaccine to potentially immunocompromised patients (e.g. HIV, on immunosuppressive therapy, etc.) with HPV-related dysplasia or cancer. In non-HPV related scenarios, 24–50% respondents reported they would offer the HPV vaccine to an eligible patient (Fig. 2).

Factors associated with vaccine recommendation were outpatient volume > 31 patients per week (odds ratio (OR) 2.7, 95% Confidence Interval (CI) 1.0–6.8), practicing in the South (OR 5.4, CI 1.1–27.2) compared to the Northeast, and having “good” HPV vaccine knowledge (OR 2.6, CI 1.03–6.7) (Table 2). Provider age, practice type (academic vs. non-academic), rural vs. urban, years in practice, and being a trainee were not associated with recommending the vaccine.

4. Discussion

Gynecologic oncologists have a unique opportunity to educate patients and impact HPV vaccination rates. This survey provides valuable insight into targetable and modifiable practices and barriers that may impact successful HPV vaccination in gynecologic oncology clinics. Almost all the respondents had recommended the HPV vaccine at least once in the last year; however, significant barriers exist to vaccination in Gynecology Oncology clinics, particularly in vaccine eligible women without HPV related disease.

To improve vaccination rates, gynecologic oncologists must be

knowledgeable about HPV vaccination eligibility and vaccine facilitation. We found that provider knowledge about the HPV vaccine was associated with recommending the vaccine, a pattern that is consistent with surveys of pediatricians, family practitioners and Ob/Gyns (Kasting et al., 2021; Dilley et al., 2018; Walling et al., 2019). However, almost half of the gynecologic oncologists responding to this survey were unable to correctly identify the FDA approved age range or state if the CDC recommended routine HPV vaccination over the age of 26 years old. Moreover, the majority of our respondents were not aware that they could provide prescriptions for the vaccine even though currently 48 states, Washington DC and Puerto Rico currently allow pharmacists to administer the vaccine (Legislatures NCoS, 2020). Education of gynecologic oncologists on FDA age-eligibility and the allowable prescribing practices in their state could improve the ability to successfully increase vaccination.

In addition to addressing provider level barriers, it is important to recognize clinic and system level hurdles to successful vaccination. Gynecologic oncologists often care for women with HPV-related dysplasia and play an important role in cancer prevention as growing data suggests that HPV vaccination may mitigate the risk of progression from cervical dysplasia to cancer (Lichter et al., 2020). We found that gynecologic oncologists more often offered the vaccine in HPV-related scenarios which may indicate that providers are utilizing HPV vaccination with the intent to reduce the risk of recurrent HPV-related dysplasia or cancer. However, in non-HPV-related scenarios (e.g. BRCA counseling), fewer gynecologic oncologists reported offering the HPV vaccine – this could indicate missed opportunities to maximize HPV vaccination uptake in eligible patients. A recent survey of Ob/Gyns found that a similar proportion (55%) routinely offered the HPV vaccine to patients 27–45 years old (Dilley et al., 2018). Given that only 53% of females in the younger “catch-up” age range – 19–26 years old – are vaccinated in the US, both general Ob/Gyns and gynecologic oncologists have opportunities to increase the proportion of adult patients vaccinated against HPV through offering vaccination in all women in the FDA- approved age range.

Respondents commonly cited that clinic level barriers, such as disruption of clinic flow, hindered successful vaccination. Similarly, Ob/Gyns also report lack of time in clinic as an obstacle to offering the vaccine (Kasting et al., 2021). In addition, half of our respondents reported financial encumbrances such as cost of stocking the vaccine, uncertainty about insurance coverage and cost to the patient. A survey of Ob/Gyn, family practice and pediatric providers in Hawaii also cited

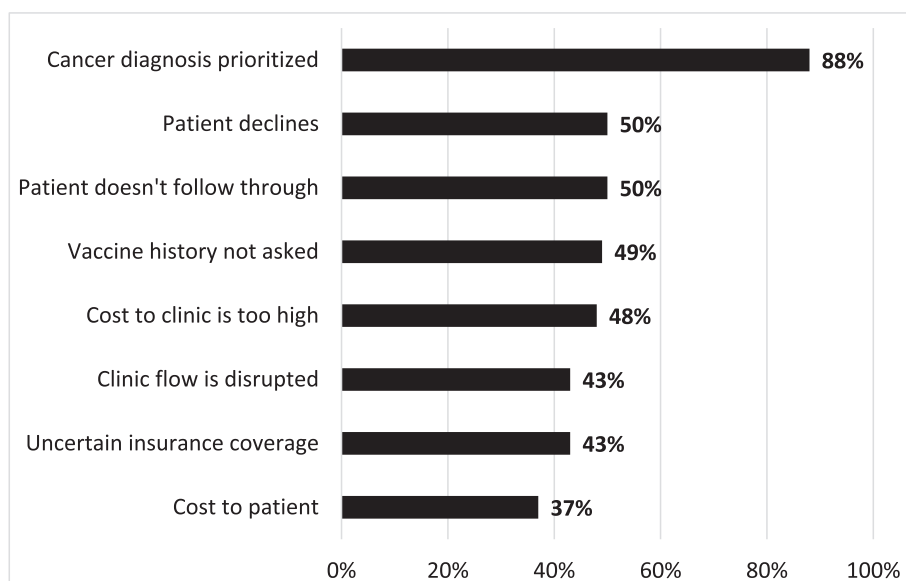


Fig. 1. Frequency of barriers to successful HPV vaccination reported by gynecologic oncologists.

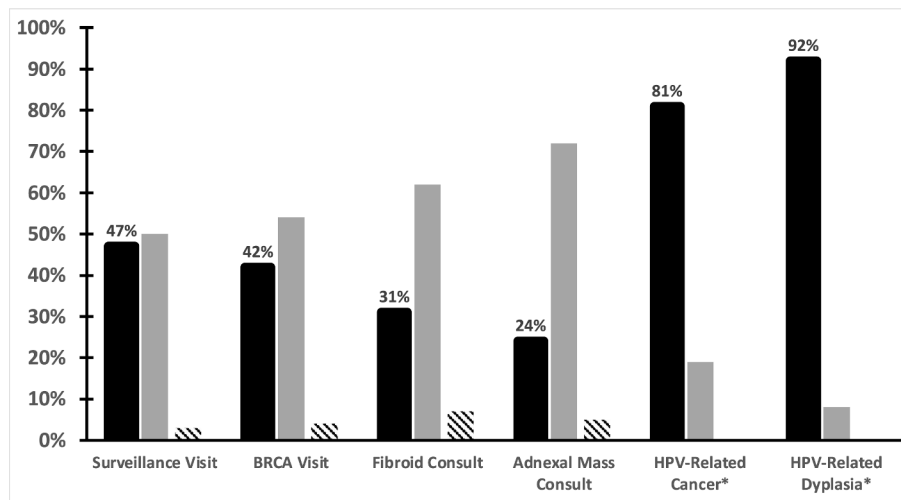


Fig. 2. Clinical scenarios in which gynecologic oncologists who both recommended and had the ability to prescribe or administer the vaccine (n = 101) reported how likely they would be to offer the HPV vaccine. N/A = not applicable * Asked as yes, no, sometimes.

Table 2
Univariate logistic regression of factors associated with having recommended the HPV vaccine within the last year.

	Odds Ratio	95% CI
Outpatients per week		
<31	Ref	
31+	2.74	1.10–6.81
Knowledge		
Low (0–2 correct)	Ref	
High (3–5 correct)	2.62	1.03–6.67
Region		
Northeast	Ref	
South	5.42	1.08–27.21
Midwest	0.75	0.25–2.24
West	0.92	0.25–3.46
Age		
<35	Ref	
35–40	1.04	0.31–3.47
41–45	2	0.38–10.5
46–50	2.4	0.27–21.37
Practice Setting		
Academic	Ref	
Non-Academic	2.06	0.67–6.48
Trainee vs Non-Trainee		
Non-trainee	Ref	
Trainee	0.41	0.15–1.12
Dedicated colposcopy clinic		
No	Ref	
Yes	0.84	0.29–2.42
Practice Location		
Rural	Ref	
Urban	1.94	0.48–7.72
Suburban	1.69	0.39–7.27

insurance coverage, stocking prices of the vaccine and reimbursement concerns as barriers to vaccination, particularly in private and smaller practices (Tom et al., 2016). One interventional study in an Ob/Gyn clinic found that designating provider champions, having staff pre-screen charts, providing financial assistance, adding prompts to clinic notes and eliminating pregnancy test requirements increased vaccination completion rates (Deshmukh et al., 2018). Although substantial changes such as hiring additional staff to facilitate vaccination may not be feasible, small process changes such as adding vaccine history to intake forms or assigning existing staff to assist with insurance vetting could improve vaccination rates. In addition, global changes like universal insurance coverage of the vaccine for all age-eligible patients could lessen systemic barriers.

Strengths of our study include its novel target surveyed population. We built on previously published surveys and then used extensive formative research to ensure inclusion of gynecologic oncology specific subject matter. Although our survey response rate was similar to other emailed surveys of SGO members (Parker et al., 2020), there may be concerns about generalizability. Female and early-career members may have been over-represented compared to the general SGO membership (Goff and Kushner, 2020). Lastly, our small number of respondents limited the ability to perform stratified and multivariable analyses.

Gynecologic oncologists have a unique opportunity to prevent cancer in a high-risk population. Our hypothesis-generating data reveals ways in which gynecologic oncologists themselves and the systems they work in could potentially increase HPV vaccination rates. Although SGO and ACOG generally support shared decision-making regarding HPV vaccination in adult women (SoG and Statement, 2021), they do not specifically detail the recommended role of gynecologic oncologists in vaccine administration and prescribing. We found that most recommend the HPV vaccine, but face barriers to successful HPV vaccination at the patient, provider, and systems levels. We identified several actionable areas that could increase HPV vaccination including increasing gynecologic oncologists’ awareness of vaccine eligibility, knowledge of prescribing laws and use of administrative assistance to address systems-level barriers. By addressing these deficiencies to maximize opportunities for prevention in gynecologic oncology practices, gynecologic oncologists can more impactfully decrease HPV related diseases.

CRediT authorship contribution statement

Mali K. Schneiter: Conceptualization, Data curation, Methodology, Visualization, Writing – original draft. **Kimberly Levinson:** Conceptualization, Writing – review & editing. **Anne F. Rositch:** Conceptualization, Writing – review & editing. **Rebecca L. Stone:** Writing – review & editing. **Amanda Nickles Fader:** Conceptualization, Writing – review & editing. **James Stuart Ferriss:** Writing – review & editing. **Stephanie L. Wethington:** Writing – review & editing. **Anna L. Beavis:** Supervision, Conceptualization, Data curation, Formal analysis, Methodology, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.gore.2022.100952>.

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