



What Impacts HPV Vaccination Recommendations? An Exploration of Medical Residents' Knowledge, Training, Barriers, and Practices

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BACKGROUND AND OBJECTIVES: Increasing human papillomavirus vaccination (HPV) uptake is critical to the prevention of cervical cancer. Effective physician communication and clinical workflow policies have a significant impact on vaccination rates. However, resident training programs vary in the inclusion of training in effective HPV practices. At Dell Medical School in Austin, Texas, HPV rates at primary care residents' clinic sites vary. We examined HPV-related knowledge, training, barriers, and practices among residents in pediatrics (Peds), family medicine (FM), obstetrics and gynecology (Ob/Gyn), and internal medicine (IM) with the aim of identifying interventional targets to improve vaccination rates.

METHODS: This was a mixed-method study including qualitative interviews and a survey. We interviewed a sample of residents from each specialty to assess their training experiences and how they discuss HPV. We recorded, transcribed, and coded interviews for thematic analysis. All residents were offered the opportunity to complete an electronic survey to quantitatively evaluate knowledge and vaccine practices. We performed χ^2 and Fisher exact analysis to compare results between disciplines.

RESULTS: HPV-related knowledge was similar across all four specialties and between resident year. Peds residents reported always recommending the HPV significantly more than FM and Ob/Gyn residents for 11-17-year-old females. Only Peds residents reported receiving evidence-based vaccine communication training. Among all residents, the primary HPV barriers included forgetting to offer the vaccine and time constraints. When discussing the vaccine, many interviewed residents were not offering a confident recommendation to all eligible patients, and instead were using a risk-based approach to vaccination.

CONCLUSIONS: There were inconsistencies across programs related to how and where residents receive HPV training. This may impact the frequency and strength of resident vaccine recommendations. To increase HPV rates, residency programs should prioritize implementation of multimodal interventions, including opt-out workflows and education on how to give confident vaccine recommendations.

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Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States and is a known cause of cervical, oropharyngeal, and other cancers.¹⁻³ At the time of this study, the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices (ACIP) recommended routine HPV vaccination (HPV) at age 11 or 12 years, with catch-up vaccination up to ages 26 years for females and 21 for males.⁴ In June 2019, the ACIP endorsed HPV in all individuals up to age 26 years and shared clinical decision-making for HPV in unvaccinated adults up to age 45 years.⁵ While safe and efficacious, HPV remains underutilized, creating a missed opportunity for cancer prevention.⁶

A strong physician recommendation is an important predictor of HPV uptake.⁷⁻¹⁰ Despite this, half of physicians deliver low-quality recommendations lacking strong, timely, and consistent endorsement.¹¹ This finding may be explained by resident physician training; a study of family medicine residency programs in Florida revealed that HPV training is inconsistent and that instruction on

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how to offer high-quality recommendations is lacking.¹² However, little is known about the level and impact of HPVV training in other primary care specialties tasked with giving HPVV.

At Dell Medical School in Austin, Texas, residents from different primary care disciplines train at separate federally-qualified health centers within the same network. HPVV initiation rates at clinics staffed by residents vary; at the pediatric clinic, for example, 91% of eligible 13-17-year-old patients received the first dose of the vaccine compared to 67% of patients at the family medicine clinic.¹³ Our study seeks to characterize HPVV-related knowledge, training, barriers, and practices among these residents in order to identify interventions to increase HPVV rates.

Methods

Pediatrics (Peds), family medicine (FM), obstetrics and gynecology (Ob/Gyn), and internal medicine (IM) residents were asked about their HPVV-related experiences through surveys and semistructured interviews. The UTHealth School of Public Health (Houston, TX) Institutional Review Board approved the study (IRB# HSC-SPH-18-0887).

Participants and Procedures

Residents were recruited to complete an electronic survey during didactic time and via email. Residents were also randomly selected to participate in phone interviews. Interviews with up to four residents from each specialty were conducted by two members of the research team.

Instruments

We adapted an online survey of 47 questions from instruments used in prior studies.^{8,14} We collected and stored data via REDCap, a secure platform for managing surveys.¹⁵ The interview guide consisted of 14 open-ended questions and was derived from a study of family medicine residents.¹²

Analysis

We performed χ^2 with Yates correction and performed Fisher exact statistical analyses on HPVV survey knowledge and recommendation data among postgraduate year-1 (PGY-1) and upper-level residents and between Peds vs other specialties at the 5% significance level.¹⁶

We used qualitative content analysis to analyze interview transcripts.¹⁷ Initially, two team members independently reviewed a set of four deidentified interviews, one per specialty, and developed a set of codes and themes for each of the preidentified domains. We discussed differences and a final coding structure was agreed upon by both coders. We created a draft codebook, which was edited as new codes and themes emerged with review of additional transcripts. Code development focused on residents' educational experiences, vaccine discussions in practice, and perceived barriers. We performed thematic analysis on all transcripts using a finalized codebook, and saturation was reached.

Results

Survey Results

The resident survey response rate was 33% for Peds (21/63), 100% for FM (21/21), 75% for Ob/Gyn (15/20), and 36% for IM (21/59). Table 1 shows survey respondent

characteristics. Peds residents more often reported always recommending HPVV, defined as offering the vaccine to patients at least 75% of the time (Figure 1). Peds residents were significantly more likely than OB residents to always recommend HPVV to females aged 11-17 years (Figure 1). Peds residents were also significantly more likely than FM residents to always recommend HPVV to females and males aged 11-17 years (Figures 1 and 2). Upper level residents were not significantly more likely to always recommend HPVV than PGY1s ($P>.05$). HPVV-related knowledge questions answered correctly ranged from 81%-85% and knowledge was not significantly different across specialties or between PGY-1 and upper-level residents (Table 2).

Thematic Analysis

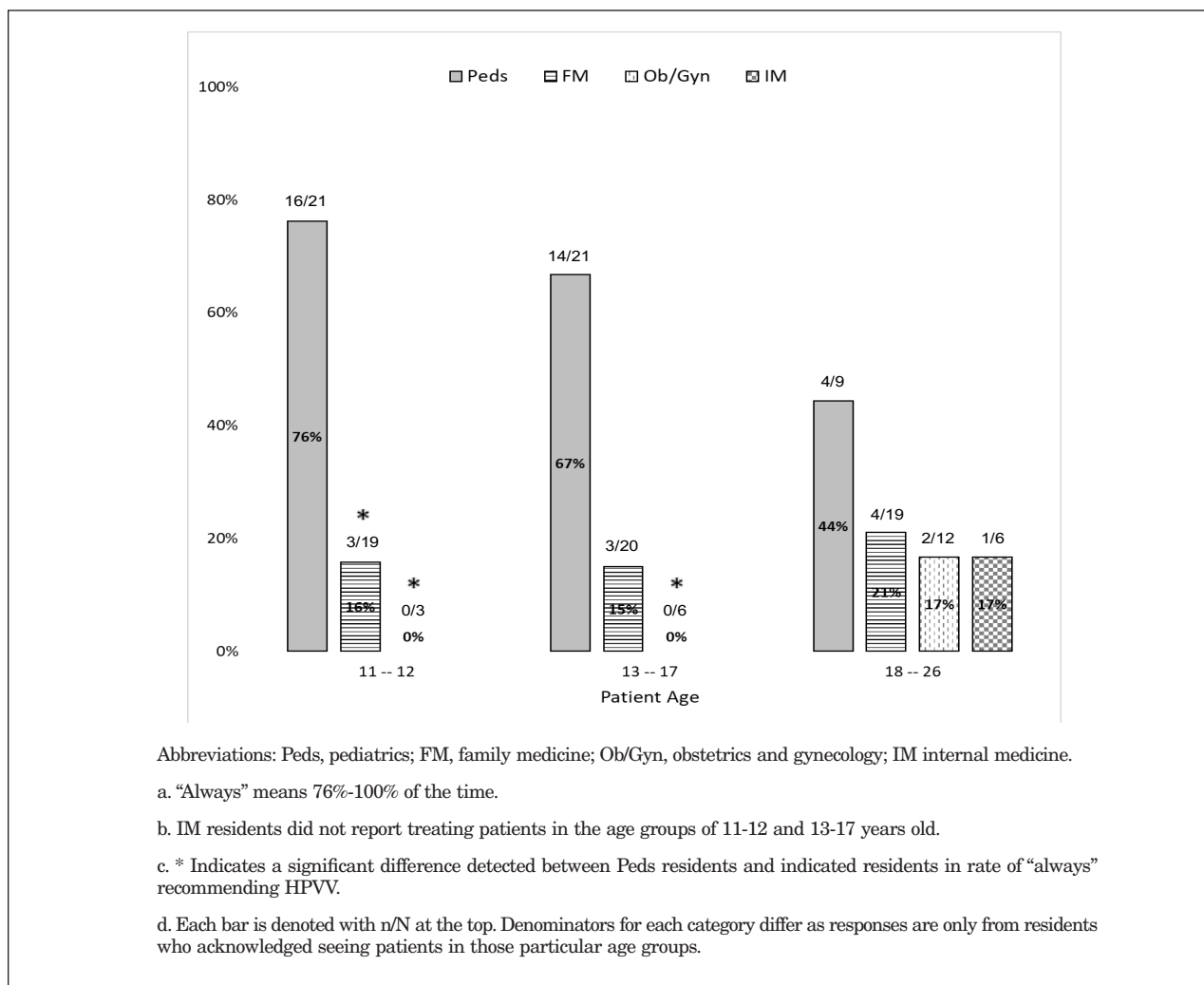
We conducted phone interviews with 14 residents, and these interviews were not connected to survey responses. We interviewed four Peds residents (50% male, 50% female; 25% PGY1, 75% upper level), four FM residents (75% male, 25% female; 25% PGY1, 75% upper level), two Ob/Gyn residents (100% female; 100% upper level), and four IM residents (50% male, 50% female; 25% PGY1, 75% upper level). Three main themes were identified:

Table 1: Sample Characteristics of Resident Physicians Who Completed the HPVV Survey (N=78)

Sex	Peds N=21 n (%)	FM N=21 n (%)	Ob/Gyn N=15 n (%)	IM N=21 n (%)
Female	12 (57.1)	11 (52.4)	14 (93.3)	8 (38.1)
Male	9 (42.9)	10 (47.6)	1 (6.7)	13 (62.9)
Residency Year				
PGY1	10 (47.6)	7 (33.3)	4 (26.7)	8 (38.0)
PGY2	9 (42.9)	7 (33.3)	3 (20.0)	6 (28.6)
PGY3	2 (9.5)	7 (33.3)	5 (33.3)	6 (28.6)
PGY4	0 (0.0)	0 (0.0)	3 (20.0)	1 (4.8)

Abbreviations: HPVV, human papillomavirus vaccination; Peds, pediatrics; FM, family medicine; Ob/Gyn, obstetrics-gynecology; IM, internal medicine.

Figure 1: Percentage of Residents Who Report “Always”^a Recommending HPV Vaccination to Female Patients by Age Group and Specialty^b



how residents receive HPVV training, perceived barriers to vaccination, and how residents communicate recommendations (Table 3).

Residents in all specialties cited modeling by attending physicians as an important way they learned about HPVV. Peds residents alone reported formal training on communication skills for recommending the vaccine.

Barriers to HPVV identified by residents across specialties included lack of time and forgetting to offer the vaccine. Some also identified challenges discussing HPVV with pediatric patients when the topic of sex might be broached.

Some residents indicated that they offer strong and consistent HPVV recommendations. Others introduced HPVV by gauging patient interest or reported using a risk-based approach to vaccination, preferentially offering HPVV to patients they perceived to be at high risk for virus acquisition.

Discussion

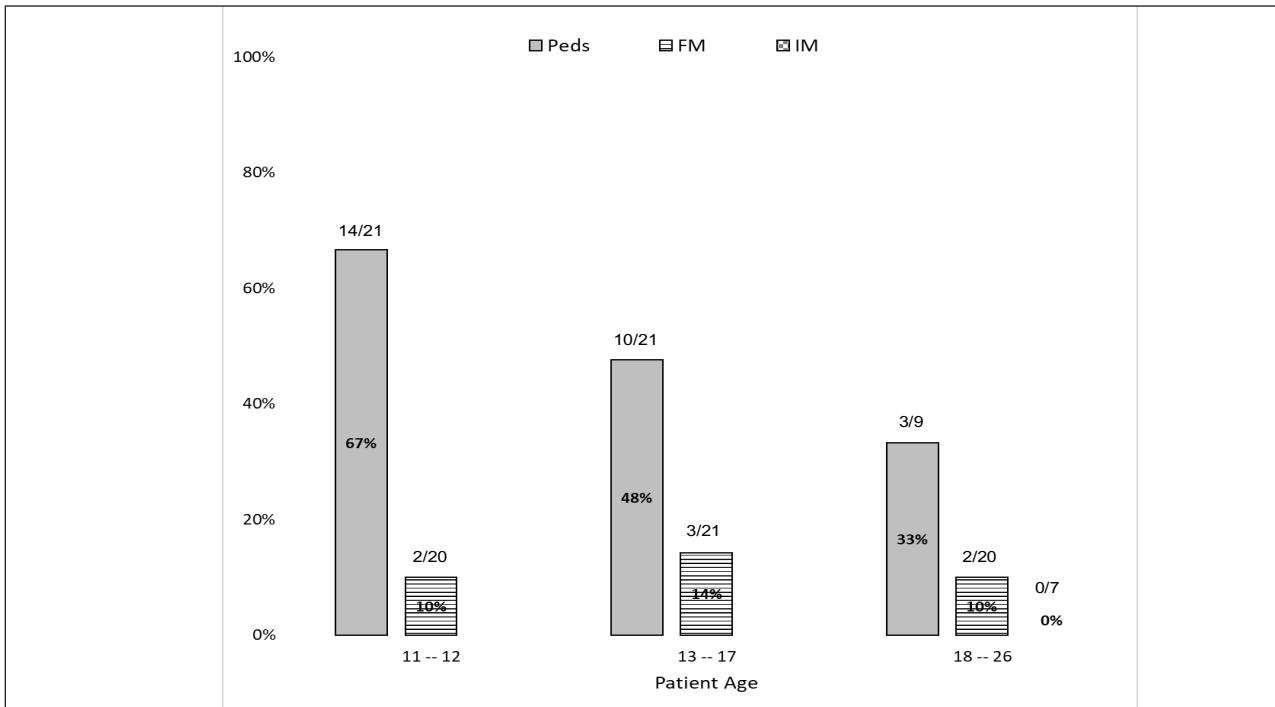
Residents in our sample were not consistently recommending HPVV, despite having almost equal HPVV-related knowledge. As with previous studies, HPVV training was variable.^{12,18} Only the Peds residents referenced training on communicating vaccine recommendations, and this

group offered HPVV at the highest rate.

When asked how they introduce HPVV, many reported strategies inconsistent with best practices.¹¹ HPVV was often brought up as an option rather than a recommendation; this participatory approach offers patients more decision-making latitude.¹⁹ However, using an announcement or presumptive approach improves HPVV acceptance, as it assumes patients or parents are ready to vaccinate.^{19,20}

Some residents felt uncomfortable discussing HPVV with sexually-naïve pediatric patients and instead singled out patients who they believed were at higher risk for

Figure 2: Percentage of Residents Who Report “Always”^a Recommending HPV Vaccination to Male Patients by Age Group and Specialty^b



Abbreviations: Peds, pediatrics; FM, family medicine; IM, internal medicine.

a. “Always” means 76%-100% of the time.

b. IM residents did not report treating patients in the age groups of 11-12 and 13-17 years old. Ob/Gyn residents did not report treating male patients so they were not included.

c. * Indicates a significant difference ($P < .05$) detected between Peds residents and indicated residents in rate of “always” recommending HPVV.

d. Each bar is denoted with n/N at the top. Denominators for each category differ as responses are only from residents who acknowledged seeing patients in those particular age groups.

contracting HPV. A risk-based approach—which has historically been used by nearly 60% of physicians—is problematic, as it is difficult to accurately assess risk related to sexual behavior.^{11,21} Failing to universally vaccinate leads to inadequate protection against HPV for the population.

Forgetting to offer HPVV to eligible patients and lack of time were commonly cited barriers to vaccination. Physician prompts that improve vaccination rates include electronic health record alerts, verbal reminders from staff, and erasable signs on exam room doors used to indicate vaccines due that day.^{22,23} Additionally, in a previous study, physicians who received a 1-hour in-clinic HPVV recommendation

training reported that the time it took to recommend the vaccine fell by 20%.²⁴ Because time constraints are common for busy residents, communication training may boost vaccination rates.

Other clinic factors likely contribute to residents’ comfort with HPVV and clinic vaccination rates. Our own previous assessment at the Austin Peds and FM resident clinics revealed important differences in culture and workflow that may explain the significantly higher vaccination rates observed among Peds residents. For example, Peds residents benefit from chart preparation by nursing staff that flags when patients are due for HPVV, text message reminders to patients who are

eligible for vaccination, and utilization of the state immunization registry. Primary care offices with higher HPVV rates report workflow ease surrounding HPVV including standing orders and chart preparation.²⁵ Such practices at the Peds resident clinic undoubtedly contribute to a culture that promotes high rates of vaccination.

The study’s limitations included small sample sizes, low survey response rates, study at a single institution, and potential for selection bias, with only a 33% survey response rate among Peds residents. However, this study is novel in that it assesses the experiences of all primary care residents, not only Peds and FM residents, and points out

Table 2: HPV Knowledge Questions Answered Correctly by Year (Upper Level Includes PGY-2, PGY-3, and PGY-4 Residents)

Knowledge Prompt/Question	PGY1 N=29 n (%)	Upper Level N=49 n (%)
Almost every person will acquire an HPV infection at some time in their life.	21 (72.4)	39 (79.6)
HPV vaccination gives lifelong protection against cervical cancer.	13 (44.8)	15 (30.6)
HPV causes anal cancers in men.	28 (96.6)	47 (95.9)
HPV causes some head and neck cancers.	26 (89.7)	46 (93.9)
HPV causes vulvar, vaginal, and anal cancers in women.	26 (89.7)	48 (98.0)
The HPV vaccine is a three-dose series, no matter how old a person is when they get their first dose.	19 (65.5)	26 (53.1)
Females who have been diagnosed with HPV infection should not be given the HPV vaccine.	26 (89.7)	48 (98.0)
For men who have sex with other men, vaccination is recommended through age 26.	25 (86.2)	38 (77.6)
For people who did not start or complete vaccination when they were younger, vaccination is also recommended for males ages 13 through 21 years.	24 (82.8)	45 (91.8)
The CDC recommends routine HPV vaccination for adolescents at age 11 or 12 years.	29 (100.0)	45 (91.8)
For people who did not start or complete vaccination when they were younger, vaccination is also recommended for females ages 13 through 26 years.	27 (93.1)	48 (98.0)
The FDA has approved the use of the HPV Vaccine through age 45.	21 (72.4)	33 (67.3)
Almost all cervical cancers are caused by HPV infection.	24 (82.8)	46 (93.9)
Genital warts are caused by the same HPV types that cause cervical cancer.	21 (72.4)	35 (71.4)
Treatment of cervical dysplasia/cancer permanently eliminates the causative infection.	27 (93.1)	46 (93.9)
Most HPV infections resolve without medical intervention.	27 (93.1)	38 (77.6)

Abbreviation: HPV, human papillomavirus vaccination.

Table 3: Themes and Selected Quotations From Peds, FM, Ob/Gyn, and IM Residents at Dell Medical School

Themes	Subthemes	Exemplary Quotes
HPV Vaccine Training and Knowledge	Informal clinician teaching: The impact of informal teaching by attendings in clinic was often referenced as a primary way residents acquired skills and knowledge surrounding HPV vaccination, especially related to vaccine recommendation delivery.	“My faculty encourages us, whenever you see the opportunity...to take it because they may not be back...they may be lost to follow-up. My approach is a little bit more problem-focused versus my faculty who truly recommend trying to hit them every time you can.” (FM resident)
	Communication: Peds residents were the only ones to reference specific training around vaccine communication.	“We did have a Grand Rounds that was specifically about HPV vaccines and strategies you can adopt to have a more positive conversation with families, and key points to try and hit on for families who may be resistant for any reason and also some interview techniques.” (Peds resident)
	Didactic sessions: Peds and Ob/Gyn residents referenced formal training on HPV, while FM and IM residents either cited no lectures dedicated to the topic or stated that HPV vaccination was included in broader topics on preventative medicine or sexual health.	“I don’t think I’ve gotten any formal training in terms of didactics or lectures specifically centered around HPV vaccination.” (FM resident)

(continued on next page)

Table 3: Continued

Themes	Subthemes	Exemplary Quotes
Barriers to HPV Vaccination	Time: Residents did not feel like they had enough time to discuss HPV with patients who were there to receive care for chronic medical conditions.	The biggest thing for me is time... You know when I'm seeing a patient that's got ten other medical problems, that's usually very low on my priority if I think about it at all." (IM resident)
	Forget: Oftentimes, residents were not remembering to offer the HPV vaccine.	"I just don't think about it for a lot of our patients. That's... probably the biggest reason that I don't encourage people to get it nearly as often as I should." (Ob/Gyn resident)
	Discomfort around sex: Some residents identified challenges discussing HPV vaccination with younger patients when the topic of sex might be broached	"Because it's sexually transmitted... it can kind of be a challenge to bring that up... So, my trepidation typically comes from the fact that I don't want to open up a conversation that I don't think the family may have had." (FM resident)
Ineffective HPV Communication Strategies	Flexible: Some residents displayed a willingness to delay vaccinations, either in response to patient hesitancy or out of a desire to build patient rapport. They sometimes approached HPV in a way that made the vaccine seem optional.	"At 11 or 12, I'm open to hearing their opinions on HPV, and then sort of letting them come back later... But I think when they start reaching mid-teens, to where being sexually active is a lot more common, at that point I get a little bit maybe less flexible." (Peds resident)
	Risk-based: Some residents used a risk-based approach to offering the HPV vaccine, preferentially offering the vaccine to patients they perceived to be at high-risk for acquiring the virus.	"It's [HPV vaccine] almost always related to like doing a pap smear or to STDs. You know, they want to be tested for STDs and you're like, 'oh by the way, do you want to be vaccinated for HPV?'... That's kind of my current practice." (IM resident)

the need for targeted training and changes in clinic culture to achieve high rates of HPV among all disciplines.

HPV is a critical cancer prevention strategy, and physicians must be empowered to offer it effectively to reduce the burden of HPV-related disease through increased HPV administration. Clinics that implement strong HPV recommendation education and adapt their workflow to promote vaccination may be ideal training centers for residents, regardless of specialty. Following the ACIP's expansion of their HPV guidelines, implementing such initiatives will be important for improving HPV rates and saving adolescent and adult lives.

PRESENTATIONS: This study was presented as a poster at the following events:

Dell Medical School Graduate Medical Education Research Day, May 10, 2019, Austin, TX.

Dell Medical School Innovation, Leadership and Discovery Scholarship Day, September 2019, Austin, TX.

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