Original Article

1.5 ANCC Contact Hours CE

Addressing Human Papillomavirus Prevention During Pediatric Acute Sexual Assault Care

Stephanie Anne Deutsch, MD, MS[1], Sarah Benyo, BS[2], Sherlly Xie, ScM[3], Eileen Carlin, BSN, RN[4], Bridgett Andalaro, MSN[4], Bernadette Clagg, BSN, RN[4], and Allan De Jong, MD[1]

Background/Objectives: Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States. Pediatric sexual assault (SA) victims are a special population eligible for HPV vaccination at the age of 9 years. National clinical practice guidelines advise clinicians to address HPV during emergency department (ED)-based SA care and at follow-up. At our institution, addressing HPV among suspected SA victims was highly variable, and HPV counseling was subsequently recommended on an ED-based acute SA clinical pathway as standard care. The aim of this study was to determine the proportion of age-eligible SA victims who received HPV counseling, determine victim characteristics associated with addressing HPV during SA care, and identify barriers to addressing HPV in the ED.

Methods: This study used a retrospective chart review of 448 pediatric SA victims presenting to the ED for acute postassault care.

Results: HPV was discussed in 10 of 56 (18%) and 37 of 49 (76%) cases in the control versus intervention groups, respectively. To verify vaccination status, caregiver recall was relied upon for 32 of 56 patients in the control group (57%) and 24 of 49 patients in the intervention group (48.9%). Factors associated with failure to discuss HPV during postassault care were younger age at encounter (*OR* = 0.78, 95% CI [0.67, 0.90], $p < 0.001$), verbal report of vaccination status verification (*OR* = 2.98, 95% CI [1.51, 6.01]), and male gender of the victim (*OR* = 3.35, 95% CI [1.20, 11.94]).

Conclusions: Significant barriers to addressing HPV in the ED setting exist, most significantly reliance on caregiver recall to guide vaccination administration, raising concern for overvaccination and undervaccination.

KEY WORDS:

Barriers to human papillomavirus counseling in the emergency department; human papillomavirus counseling; human papillomavirus vaccination; pediatric sexual assault

Author Affiliations: *[1]Department of General Pediatrics, Alfred I. DuPont Hospital for Children; [2]Sidney Kimmel Medical College at Thomas Jefferson University; [3]Hobart, William and Smith Colleges; [4]Delaware-CTR ACCEL Program, Nemours/Alfred I. DuPont Hospital for Children; [5]Department of Emergency Medicine, Alfred I. DuPont Hospital for Children.*

Sarah Benyo was supported by the Nemours Foundation under the Department of Biomedical Research, Office of Research Educational Programs, Summer Undergraduate Research Program.

This work was supported by an Institutional Development Award from the National Institute of General Medical Sciences of the National Institutes of Health under Grant number U54-GM104941 (PI: Binder-Macleod).

The authors declare no conflict of interest.

Correspondence: *Stephanie Anne Deutsch, MD, MS, Division of General Pediatrics, Alfred I. DuPont Hospital for Children, 1600 Rockland Road, Wilmington, Delaware 19803. E-mail: Stephanie.deutsch@nemours.org.*

Received February 8, 2018; accepted for publication March 31, 2018.

DOI: 10.1097/JFN.0000000000000209

Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States. Although most HPV infections self-resolve without any long-term health problems, HPV has been associated with genital warts and cervical, vaginal, penile, anal, and oropharyngeal cancers (Centers for Disease Control and Prevention [CDC], 2017b). Annual incidence is approximately 14 million, and nearly half of all new cases are diagnosed in young people aged 15–24 years (CDC, 2013). The prevalence of infection and the potential for morbidity and mortality from the acquisition of HPV have prompted the establishment of vaccination guidelines for children and adolescents (CDC, 2017c), irrespective of reported sexual history. However, caregiver perceptions and attitudes about the vaccine, including concerns that the vaccination will influence subsequent sexual behaviors, the low perceived risk of acquiring HPV infection from sexual activity, and irregular preventive healthcare seeking behaviors, all pose barriers to the initiation and completion of the vaccination series (Holman et al., 2014).

The CDC Advisory Committee on Immunization Practices (ACIP) identified children and adolescents with a history of sexual assault as a special population eligible for HPV vaccination beginning at the age of 9 years (CDC, 2017c). Updated by CDC/ACIP in 2017, a two-dose schedule is considered appropriate for persons initiating vaccination before 15 years old; or a three-dose schedule, for those beginning the vaccine sequence after 15 years old (CDC, 2017c). The American Academy of Pediatrics clinical guidelines for the care of adolescent sexual assault victims endorse the CDC/ACIP recommendations and advise that healthcare providers address HPV vaccination during emergency department (ED)-based sexual assault care and at follow-up visits (Crawford-Jakubiak, Alderman, Leventhal, Committee on Child Abuse and Neglect, & Committee on Adolescence, 2017).

Routinely incorporating preventive healthcare at the time of ED presentation after pediatric sexual assault, including counseling on risks of HPV acquisition and providing opportunity for vaccination, represents a unique opportunity to aid critical public health efforts to decrease the incidence of HPV among young people. Sexual assault victims often have significant unmet healthcare needs, and follow-up care with primary care providers is highly variable (Gavril, Kellogg, & Nair, 2012; M. M. Holmes, Resnick, & Framptom, 1998). Sexual assault survivors are also more likely to engage in high-risk sexual practices, including earlier initiation of sexual activity linked to HPV transmission (M. M. Holmes et al., 1998). For these reasons, increasing early vaccination in this population is critical.

Our institution is a large metropolitan tertiary care center annually serving approximately 500 children and adolescents presenting for acute sexual assault care. However, despite the CDC/ACIP recommendations, addressing HPV in the ED during postassault care was highly variable. Recognition of HPV prevention as a critical health issue for sexual assault victims prompted our institution's medical providers to prioritize HPV vaccination during postassault care. Recommendations were included on the institution's ED-based sexual assault clinical pathway in October 2016 to deliver HPV-focused care, which encompassed counseling around HPV infection and offering HPV vaccination as a routine prophylaxis for age-eligible children/adolescents. The impact of these recommendations required evaluation. Therefore, the primary aim of this study was to determine the proportion of age-eligible children/adolescents presenting for acute sexual assault care whose medical records indicated that HPV-focused care was delivered. Secondarily, we were also interested in determining child/adolescent characteristics associated with failure to address HPV during acute sexual assault care and identify process/workflow-related barriers to addressing HPV in the ED setting.

Methods

Setting and Study Population

The project setting was the ED of a large metropolitan tertiary care center annually serving approximately 500 children and adolescents presenting for acute sexual assault care. The study population consisted of children and adolescents younger than 21 years old presenting for ED care after acute sexual assault (defined as nonconsensual sexual contact occurring within the last 72 hours) between October 1, 2015, and October 1, 2017. Children and adolescents presenting to the ED for nonacute sexual assault care (defined as 72 or more hours after sexual contact) were excluded. An ED-based sexual assault clinical pathway was available for reference by clinical staff providing acute sexual assault care, and an ED-based hospital forensic nursing team assisted with care of all victims of sexual assault included in this study. Study subjects were identified from a prospective clinical database maintained by the hospital forensic nursing team. Our research protocol was reviewed and approved by the Nemours/AIDHC Institutional Review Board.

Data Collection

Predefined variables were abstracted from the forensic nursing team database and patient electronic medical records and included age, gender, race, type of sexual contact disclosed, and alleged perpetrator relationship. The type of sexual contact disclosed was categorized as perpetrator-to-victim digital–genital, oral–genital, genital–genital, or other types of contact, which included disclosure of multiple types of sexual contact, insertion or use of a foreign body during sexual contact, or disclosures in which the nature of the inappropriate sexual contact was unclear, unknown, or not specified at the time of ED evaluation. Subjects were categorized

as age-eligible for HPV vaccination based on CDC/ACIP recommendations relevant to the date of ED presentation for acute sexual assault care. For cases in which medical record documentation indicated that HPV vaccination status was ascertained during postassault care, whether this was based on an electronic medical record review or caregiver recall was abstracted. For cases in which medical record documentation indicated that HPV counseling was performed and vaccination was discussed/offered, whether the vaccine was administered or refused in the ED or an outpatient plan for vaccination was established was also abstracted.

Data Analysis

The primary outcome of interest was the proportion of children and adolescents presenting for acute sexual assault care who were counseled about HPV, including the discussion of vaccination. For purposes of statistical analysis, children and adolescents identified between October 1, 2015, and September 30, 2016, were considered control subjects; intervention subjects included those presenting for acute sexual assault care between October 1, 2016, and October 1, 2017, after the implementation of the HPV-focused care recommendations on the institutional clinical pathway. Descriptive statistics including means, medians, counts, and proportions were calculated for study variables. Mann–Whitney *U* test, chi-square test, and Fisher's exact test were used for bivariate comparisons. Because we were interested in characteristics associated with failure to address HPV among age-eligible sexual assault patients, logistic regression was used to assess the association of age, race, gender, perpetrator relationship, type of sexual contact disclosed, and vaccination status verification method with nonadherence to pathway recommendations. The significance level was set at $\alpha = 0.05$. R Statistical Software (R Core Team, 2016) was used for statistical analysis.

Results

The study population included 448 children and adolescents presenting for acute sexual assault care; 151 children/adolescents were categorized as control subjects, and 125 were categorized as intervention subjects. Population characteristics are described in Table 1. Most study subjects ($n = 288$) were younger than 9 years old, Black ($n = 180$), and female ($n = 342$). Nearly three times as many female subjects presented for acute sexual assault care compared with male subjects ($n = 106$). This is consistent with prior literature and clinical experience, which supports that male victims of sexual assault are less likely to disclose inappropriate sexual contact when compared with female victims (G. R. Holmes, Offen, & Waller, 1997). One hundred four subjects disclosed digital–genital sexual contact, and 58 disclosed genital–genital contact. For most of the children and adolescents ($n = 253$), the type of inappropriate sexual contact was categorized as other, which included disclosure of multiple types of sexual contact, insertion or use of a foreign body during sexual contact, or disclosures in which the nature of the inappropriate sexual contact was unclear, unknown, or not specified at the time of ED evaluation. The distribution of type of sexual contact was different

TABLE 1. General Study Population Characteristics

Characteristic		Total (%; *N* = 448)	Control group (%; *n* = 151)	Intervention group (%; *n* = 125)	*p* Value
Age (years)	0 to <9	288	95	76	0.81
	≥9	160	56	49	
Race	White, non-Hispanic	173	61 (40.4)	58	0.76
	Black	180	59 (39)	43	
	Hispanic	56	22 (14.6)	15	
	Asian American/Alaskan	5	1 (0.7)	2	
	Other/unknown	34	8 (5.3)	7	
Gender	Male	106	31 (20.5)	34	0.25
	Female	342	120 (79.5)	91	
Perpetrator relationship	Family	215	77	60	0.38
	Acquaintance	161	50	37	
	Other/unknown	72	24	28	
Type of contact disclosed	Digital–genital	104	29	39	0.02
	Oral–genital	33	18	8	
	Genital–genital	58	18	22	
	Other	253	86	56	

TABLE 2. Population Characteristics of Children Age-eligible for HPV Vaccination

Characteristic		Total (%; *N* = 105)	Control group (%; *n* = 56)	Intervention group (%; *n* = 49)	*p* Value
Race	White, non-Hispanic	49	26	23	0.32
	Black	33	14	19	
	Hispanic	17	11	6	
	Asian American/Alaskan	1	1	0	
	Other/unknown	5	4	1	
Gender	Male	15	6	9	0.40
	Female	90	50	40	
Perpetrator relationship	Family	34	18	16	0.67
	Acquaintance	53	30	23	
	Other/unknown	18	8	10	
Type of contact disclosed	Digital–genital	22	8	14	0.07
	Oral–genital	7	4	3	
	Genital–genital	35	16	19	
	Other	41	28	13	

Note. HPV = human papillomavirus.

among control versus intervention subjects ($p = 0.02$). Most perpetrators of abuse were identified as family members ($n = 215$) or acquaintances ($n = 161$).

Population characteristics specifically of children and adolescents deemed age-eligible for HPV vaccination at the time of their postassault care are described in Table 2. Most children were White ($n = 49$) and female ($n = 90$); the type of inappropriate sexual contact was categorized as "other" for 41 of the children and adolescents. Differences in distribution of the type of sexual contact among vaccine age-eligible control versus intervention subjects did not reach statistical significance. Specifically, among vaccine age-eligible children, 56 children and adolescents were included in the control group and 49 were included in the intervention group (see Table 3). For 10 of 56 (18%) control group subjects and 37 of 49 (76%) intervention group subjects, HPV counseling was performed and vaccination was discussed; this increase in percentage is statistically significant. Nine children/adolescents in the intervention group were vaccinated in the ED at the time of acute postassault care; notably, HPV vaccination was not performed for any children/adolescents in the control group before the implementation of clinical pathway recommendations. Eleven children/adolescents in the intervention group preferred to defer HPV vaccination during ED care, and outpatient plan for follow-up administration at their pediatrician's office was established. To verify vaccination status among the 105 age-eligible subjects in the control and intervention groups, caregiver recall was relied upon for 32 of 56 patients in the control group (57%) and 24 of 49 patients in the intervention group (48.9%).

Factors associated with failure to deliver HPV-focused care during ED sexual assault evaluations were younger age at encounter ($OR = 0.78$, 95% CI [0.67, 0.90], $p < 0.001$),

TABLE 3. HPV Recommendations

Verification of HPV status		Control group (*n* = 56)	Intervention group (*n* = 49)	*p* Value
Verification of HPV status	Electronic medical record	23	24	0.57
	Caregiver recall	32	24	
HPV Vaccination	Discussed	10	37	<0.0001
	Up-to-date, no action needed	7	17	
	Not up-to-date, vaccine administered in the ED	0	9	
	Not up-to-date, outpatient plan for vaccination established	3	11	
	Not discussed	46	12	

Note. HPV = human papillomavirus; ED = emergency department.

verbal report of vaccination status verification (*OR* = 2.98, 95% CI [1.51, 6.01]), and male gender of the victim (*OR* = 3.35, 95% CI [1.20, 11.94]; see Table 4). A specific type of disclosed sexual contact was not associated with failure to address HPV during postassault care.

Discussion

Addressing HPV in the ED setting after pediatric acute sexual assault is endorsed by national clinical practice guidelines. However, whether this preventive healthcare issue is prioritized in actual clinical practice, as well as the feasibility of this recommendation, is largely unknown.

This study builds on the paucity of literature around HPV and pediatric sexual assault victims and describes a single institution's experience with the implementation of a protocol to provide HPV-focused care routinely in the ED setting during sexual assault evaluations. Not unexpectedly, the inclusion of recommendations to address HPV during postassault care on our institutional clinical pathway resulted in increased performance of HPV-related counseling, offering of vaccination, and actual vaccination in the ED. More importantly, adaptation of this recommendation into the clinical workflow exposed several significant barriers to appropriately addressing preventive healthcare in the ED setting. The impact of pathway recommendations on patient care and patient outcomes highlighted a need to refine our institution-specific clinical workflow through continual process improvement. From our results emerge several generalizable conclusions regarding the difficulty of addressing preventive healthcare in the ED setting, which obviates the need for the establishment of ED-based best practices for HPV prevention among pediatric sexual assault victims.

Development and implementation of clinical pathways can standardize care delivery and reduce variability in clinical decision making. Not surprisingly, whereas previously HPV had been largely unaddressed among pediatric sexual assault victims at our institution, the inclusion of recommendations for HPV-focused care on our sexual assault clinical pathway was associated with a change in clinical practice. Performance of HPV counseling, discussions about vaccination, offering of vaccination, and actual vaccine administration in the ED increased after pathway implementation. Vaccination status was more routinely ascertained, and study results showed that coverage against HPV among children/adolescents in our geographic area is significant; most children/adolescents were assessed as already up-to-date with vaccination recommendations at the time of postassault care. This was not unexpected, as the CDC 2015 HPV vaccination coverage report for Delaware indicates that the average coverage range among children/adolescents who have received vaccination is 65%–69% (CDC, 2016b). These rates lie above the national average (63%) and are higher than those of the neighboring states of Pennsylvania, New Jersey, and Maryland (Reagan-Steiner et al., 2016), providing evidence that educational campaigns to increase pediatric HPV vaccination rates in Delaware have been effective to date.

Although clinical pathways can reduce variation in care, nonadherence to pathway recommendations may persist

TABLE 4. Factors Associated With Failure to Address HPV During Postassault Care

Factor		During the Entire Study Period of 2014–2017 *OR* (95% CI)	*p*
Age (years)		0.78 (0.67, 0.90)	0.001
Race	White, non-Hispanic	1	–
	Black	1.47 (0.70, 3.14)	0.31
	Hispanic	0.90 (0.34, 2.45)	0.84
Method of vaccination status verification	Electronic medical record	1	–
	Verbal report	2.98 (1.51, 6.01)	0.002
Gender	Female	1	–
	Male	3.35 (1.20, 11.94)	0.03
Perpetrator relationship	Family	1	–
	Acquaintance	0.76 (0.34, 1.62)	0.76
	Other/unknown	0.44 (0.16, 1.22)	0.44
Type of contact disclosed	Digital–genital	1	–
	Oral–genital	1.60 (0.34, 8.85)	0.58
	Genital–genital	1.31 (0.50, 3.39)	0.56
	Other	2.32 (0.92, 5.85)	0.07

Note. HPV = human papillomavirus.

despite pathway implementation. Persistent variability may reflect healthcare provider, institution, and guideline- or patient-specific factors, including biases, issues of autonomy, or lack of education/knowledge around the specific medical condition/diagnosis. Results of our regression analysis indicated that younger age of sexual assault victim, male gender, and lack of vaccination record available in the electronic medical record (resulting in reliance on caregiver report) were associated with pathway nonadherence, specifically failure to discuss HPV or to offer vaccination during postassault care. Of note, the type of disclosed sexual contact was not associated with failure to address HPV, which may indicate a growing awareness among healthcare providers that HPV can be transmitted by multiple forms of sexual contact including digital–genital.

Precise reasons why failure to address HPV occurred specifically among younger age-eligible patients, male patients, or those who lacked verifiable vaccination records remain unclear. Possible reasons are broad but could generally represent lack of adequate education/knowledge about HPV, including indications for vaccination. Alternatively, healthcare provider cognitive biases (including gender bias) around appropriate candidates for HPV vaccination could have also played a role. For example, healthcare providers may require additional education about the association of HPV with penile/anal cancers. Regrettably, many healthcare providers associate HPV infection traditionally as a female disease (such as cervical cancer) and therefore prioritize HPV discussion and vaccination among female patients. Recent public educational campaigns to increase awareness that HPV vaccination is also effective against male cancers may mitigate this female-centric bias in the future (CDC, 2016a). It is also possible that many medical providers view HPV-related health outcomes as distal, affecting adult patients because of the latency/dormancy of the disease, and fail to recognize HPV as a pediatric health issue. Furthermore, many medical providers may be aware that current CDC/ACIP recommendations endorse routine administration of HPV vaccination among adolescent female and male patients at well-child visits. However, further education may be necessary around indications specific to sexual assault victims—that both young male and female child victims of suspected sexual assault are eligible to initiate vaccination as early as the age of 9 years. Failure to discuss HPV routinely among both male and female patients, and initiate early vaccination, represents a missed opportunity to engage in anticipatory guidance around safe sexual practices in a high-risk population.

Why caregiver verbal report of vaccination status influenced adherence to pathway recommendations remains unclear; however, it is most likely that healthcare providers were concerned that reliance on caregiver report to guide vaccination decisions could result in errant vaccination, either undervaccination or overvaccination. The accuracy of caregiver reports regarding vaccination status as up-to-date versus not up-to-date with HPV vaccination at the time of acute sexual assault care was not confirmed with state/jurisdictional vaccination records. Whether caregivers tended to overreport or underreport vaccination status among pediatric sexual assault victims was not specifically assessed in this study.

From a process implementation/clinical workflow standpoint, study results illustrated a significant barrier to appropriately addressing HPV in the ED setting at our institution. Most critically, among age-eligible sexual assault victims, 50% lacked verifiable vaccination status within the electronic medical record. This resulted in reliance on caregiver recall of vaccination history to potentially steer ED decision making. Unfortunately, caregiver recall is often subject to significant bias, is prone to error, and may be potentially unreliable, particularly in crisis/stress-enhancing circumstances such as ED evaluations for sexual assault. The validity of parent-reported vaccination histories is known to vary, including by type of vaccine (Seña et al., 2015). Because reliance on caregiver recall may result in undervaccination or overvaccination of children/adolescents, concerns about errant vaccination practices may have deterred providers from addressing HPV among children/adolescents lacking verifiable vaccination status in the electronic medical record, as previously mentioned. Concerns regarding the adverse effects of overvaccination may have existed among both caregivers and healthcare providers relying on caregiver report; however, this was not specifically assessed. To date, safety outcomes associated with errant HPV vaccination beyond evidence of solicited local symptoms after administration have not been reported (CDC, 2017a; Ogawa, Takei, Ogawa, & Mihara, 2017). Furthermore, there are currently no outcome data suggesting that HPV vaccination formulations are systemically dangerous or pose a significant health risk. Although the proportion of study subjects at our institution who may have received HPV vaccination inappropriately at the time of sexual assault care is unknown, children/adolescents may have been underimmunized/overimmunized at the time of their assault care resulting from errant caregiver recall. The lack of adverse effects from errant vaccination with HPV may not be universally known by healthcare providers or caregivers.

Other issues related to the verification of vaccination status among pediatric sexual assault victims exist. Although most jurisdictions routinely track vaccination administration among pediatric patients, not all registries standardize documentation of receipt of HPV vaccination; this clearly compounds difficulty in accurately assessing HPV vaccination status at the time of acute postassault care. At our institution during the specified study period, routine practice of verifying vaccination status against available state/jurisdictional registries by ED clinical staff during postassault care was not performed. However, a need for

potential revisions to the ED clinical workflow became apparent as a result of this study.

Finally, for reasons that are unclear, even after the implementation of the pathway recommendations, a nearly equal proportion of patients chose to defer vaccination to the outpatient setting compared with ED-based vaccination. Whether caregivers perceived there to be a low risk of acquisition of HPV infection from sexual assault or considered vaccination to be a nonemergent, preventative healthcare issue, more appropriate for the outpatient setting, remains unknown, as caregiver perceptions around HPV-focused care in the ED were not specifically assessed in this study. The proportion of children and adolescents who actually followed up with their pediatrician for either initiation or continuation of HPV vaccination after their ED visit is also unknown. Clearly, this information could be useful to inform efforts to increase HPV vaccination rates in the ED setting during postassault care. Although data around the efficacy of vaccination remain unclear, there may be some benefit in even a one-dose administration of HPV in the acute setting (Dorell, Jain, & Yankey, 2011).

Implications for Forensic Nursing

Implications for clinical forensic nursing practice are many. Generalizable across ED settings, forensic nurses can clearly shape standardization of the methods by which vaccination status is verified, such as routinely using available registry/public health data to prevent errant vaccination practices by healthcare providers. Although ideal, this may not be universally practical, depending on the time or resource intensity required for verification and/or current jurisdictional vaccination tracking practices. Specific to this institution's ED workflow, study results support protocol development to verify vaccination status with jurisdictional registries when possible. Clinical forensic nursing can also play a valuable role in increasing education/awareness around appropriate vaccination candidates and mitigating clinician bias, to ensure that younger children and male sexual assault victims are routinely included in universal HPV prevention efforts. Finally, forensic nurses can play a critical role as patient advocates, communicating with pediatricians in the community or other outpatient providers to ensure that communication is accurate regarding the initiation, continuation, or completion of vaccination in the ED during acute sexual assault care.

Implications for Future Practice and Research

The results of our study highlight several areas of direction for future research. Most significantly, a more extensive study of HPV infection among pediatric sexual assault victims is urgently needed. First, the true proportion of children/adolescents who actually acquire HPV infection from sexual assault may be higher than previously recognized, although accurate detection rates may be difficult to ascertain. Many children/adolescents presenting for acute care lack physical evidence of infection on examination yet might still harbor subclinical diseases. Follow-up among victims of sexual assault is variable, and infections may remain latent for months to years before clinical signs/symptoms are recognized, both of which impact accurate ascertainment of incidence and prevalence of infection related to sexual assault. However, despite broad HPV vaccination coverage efforts among children/adolescents, annual incidence of HPV infection nationally remains high. Therefore, HPV prevention efforts are critical, but how best to coordinate care, specifically among those at a high risk for infection acquisition, remains ill-defined. A better understanding of the effectiveness of HPV prevention efforts during ED assault care on pediatric health outcomes is needed to develop best practices. Understanding patterns of follow-up care among pediatric victims of suspected sexual assault, including how best to coordinate continuation of HPV vaccination series initiated in the ED, should be prioritized in public health research.

Limitations

Conducted within a single institution, this study has several obvious and significant limitations. First, our study is limited by a small sample size, and the retrospective nature of data collection is subject to potential inaccuracies. During our specified study period, broader quality improvement efforts to standardize ED sexual assault care among pediatric patients were simultaneously occurring; although none specifically focused on HPV care delivery, it is possible that nonrelated simultaneous efforts and/or temporal trends in some way influenced adherence to pathway recommendations.

Conclusions

Addressing HPV in the ED setting is achievable and may aid public health efforts to prevent the rising incidence of infection. Barriers to appropriate vaccination exist, including reliance on caregiver report to verify vaccination status, which may result in errant immunization practices among pediatric sexual assault victims. Development of best practices around addressing HPV in pediatric victims of sexual assault requires further study.

Acknowledgments

The authors would like to acknowledge Drs. Arezoo Zomorrodi, MD, and Amy Thompson, MD, for their assistance with the pathway development and Dr. Sue Marcus, PhD, for her assistance with statistical analysis and article revision.

References

Centers for Disease Control and Prevention. (2013). *Incidence, prevalence, and cost of sexually transmitted infections in the United States*. Retrieved from https://www.cdc.gov/std/stats/sti-estimates-fact-sheet-feb-2013.pdf

Centers for Disease Control and Prevention. (2016a). *HPV vaccination is cancer prevention for boys too*. Retrieved from https://www.cdc.gov/features/hpvvaccineboys/index.html

Centers for Disease Control and Prevention. (2016b). National, regional, state, and selected local area vaccination coverage among adolescents aged 13–17 years—United States, 2015. Retrieved from https://www.cdc.gov/mmwr/volumes/65/wr/mm6533a4.htm#T3_down

Centers for Disease Control and Prevention. (2017a). *Frequently asked questions about HPV vaccine safety*. Retrieved from https://www.cdc.gov/vaccinesafety/vaccines/hpv/hpv-safety-faqs.html

Centers for Disease Control and Prevention. (2017b). *Genital HPV infection-fact sheet*. Retrieved from https://www.cdc.gov/std/hpv/stdfact-hpv.htm

Centers for Disease Control and Prevention. (2017c). *Recommended immunization schedule for children and adolescents aged 18 years or younger*. Retrieved from https://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf

Crawford-Jakubiak, J. E., Alderman, E. M., & Leventhal, J. M.; Committee on Child Abuse and Neglect & Committee on Adolescence. (2017). Care of the adolescent after an acute sexual assault. *Pediatrics*, *139*(3), e20164243. doi:10.1542/peds.2016-4243

Dorell, C. C., Jain, N., & Yankey, D. (2011). Validity of parent-reported vaccination status for adolescents aged 13–17 years: National immunization survey-teen, 2008. *Public Health Reports*, *126*(Suppl. 2), 60–69.

Gavril, A. R., Kellogg, N. D., & Nair, P. (2012). Value of follow-up examinations of children and adolescents evaluated for sexual abuse and assault. *Pediatrics*, *129*(2), 282–289.

Holman, D. M., Benard, V., Roland, K. B., Watson, M., Liddon, N., & Stokley, S. (2014). Barriers to human papillomavirus vaccination among US adolescents: A systematic review of the literature. *JAMA Pediatrics*, *168*(1), 76–82.

Holmes, G. R., Offen, L., & Waller, G. (1997). See no evil, hear no evil, speak no evil: Why do relatively few male victims of childhood sexual abuse receive help for abuse-related issues in adulthood? *Clinical Psychology Review*, *17*(1), 69–88.

Holmes, M. M., Resnick, H. S., & Frampton, D. (1998). Follow-up of sexual assault victims. *American Journal of Obstetrics and Gynecology*, *179*(2), 336–342.

Ogawa, Y., Takei, H., Ogawa, R., & Mihara, K. (2017). Safety of human papillomavirus vaccines in healthy young women: A meta-analysis of 24 controlled studies. *Journal of Pharmaceutical Health Care Sciences*, *3*, 18. doi:10.1186/s40780-017-0087-6

R Core Team. (2016). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from https://www.R-project.org/

Reagan-Steiner, S., Yankey, D., Jeyarajah, J., Elam-Evans, L. D., Curtis, C. R., MacNeil, J., … Singleton, J. A. (2016). National, regional, state, and selected local area vaccination coverage among adolescents aged 13–17 years—United States, 2015. *Morbidity and Mortality Weekly Report*, *65*(33), 850–858.

Seña, A. C., Hsu, K. K., Kellogg, N., Girardet, R., Christian, C. W., Linden, J., … Hammerschlag, M. R. (2015). Sexual assault and sexually transmitted infections in adults, adolescents, and children. *Clinical Infectious Diseases*, *61*(Suppl. 8), S856–S864.

Instructions:

- Read the article. The test for this CE activity can only be taken online at http://nursing.ceconnection.com. Tests can no longer be mailed or faxed.
- You will need to create (its free!) and login to your personal CE Planner account before taking online tests. Your planner will keep track of all your Lippincott Professional Development online CE activities for you.
- There is only one correct answer for each question. A passing score for this test is 13 correct answers. If you pass, you can print your certificate of earned contact hours and access the answer key. If you fail, you have the option of taking the test again at no additional cost.
- For questions, contact Lippincott Professional Development: 1-800-787-8985.

Registration Deadline: September 4, 2020

Disclosure Statement:
The authors and planners have disclosed no potential conflict of interest, financial or otherwise.

Provider Accreditation:
Lippincott Professional Development, will award 1.5 contact hours for this continuing nursing education activity.

Lippincott Professional Development is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 1.5 contact hours. Lippincott Professional Development is also an approved provider of continuing nursing education by the District of Columbia, Georgia, and Florida, CE Broker #50-1223.

Payment and Discounts:

- The registration fee for IAFN members is $12.50; for nonmembers, $17.95.
- IAFN members — To obtain the discounted fee online, members can take the test by logging into the secure "Members Only" area of www.iafn.org to get the discount code. Use the code when payment is requested when taking the CE test at http://nursing.ceconnection.com.

For additional continuing nursing education activities related to forensic nursing, go to nursingcenter.com/ce.