Vaccine 36 (2018) 4897–4903

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Three-dose HPV vaccine completion among sexual and gender minority young adults at a Boston community health center

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ARTICLE INFO

Article history:
Received 20 February 2018
Received in revised form 24 June 2018
Accepted 26 June 2018
Available online 5 July 2018

Keywords:
Human papillomavirus
HPV
Vaccine
HPV-related cancers
Sexual and gender minority
Transgender

ABSTRACT

Background: Disparities in human papillomavirus (HPV) vaccination completion have been noted among sexual and gender minority (SGM) people. Little is known about factors associated with HPV vaccination among SGM people. This study examines factors linked with completion of HPV vaccination among SGM patients.

Methods: We collected cross-sectional data from electronic health records (EHRs) of SGM patients receiving primary care at a Boston community health center specialized in SGM health. We employed a binomial logistic regression model to identify factors associated with 3-dose HPV vaccine completion.

Results: Patients were 70.3% white, with mean age of 26.3 years (SD = 2.48), 26.9% identifying as gender minorities and 79% as sexual minorities, 48.9% with 4-year college or graduate degrees, 59.4% employed, 65.9% with private insurance, 39.1% living at or below the federal poverty level, and 8.3% living with HIV. Seventy-seven percent of patients who were offered HPV vaccination had completed the series. Factors significantly associated with HPV vaccine completion included: 4-year college or graduate degree (OR: 2.87; 95% CI = 1.26–6.53), completion of primary care appointments (OR: 1.03; 95% CI: 1.01–1.05), Hepatitis A or B vaccine completion (OR: 2.59; 95% CI: 1.2–5.59), and visits for a sexually transmitted infection (STI) screen (OR: 1.22; 95% CI: 1.03–1.43).

Conclusion: Vaccine completion was higher among SGM with higher levels of education, Hepatitis A or B vaccination, and completed health visits. These findings highlight potential ways to increase HPV vaccination, such as offering tailored HPV vaccine education, bundling with other vaccines, and incorporating HPV vaccination with STI screenings.

1. Introduction

Human papillomavirus (HPV), the most common sexually transmitted infection [1], may cause genital warts and cancers of the cervix, vulva, vagina, anus, penis, head and neck [2]. The primary preventative measure to reduce HPV-related disease is vaccination. The Centers for Disease Control (CDC) recommend HPV vaccination for all children at age 11–12 years, with a catch-up vaccination up to age 21 years for males and up to age 26 years for females if not previously vaccinated [3]. HPV vaccination is also recommended for HIV-infected men and men who have sex with men (MSM) up through 26 years of age.

Despite these vaccine recommendations, both initiation and completion of the HPV vaccine have fallen short of national goals [4]. While vaccine initiation persists as a problem, this study focuses on factors associated with vaccine completion. Initial immune response with <3-doses is robust; among adolescents aged 15 years and older, however, all 3 doses are needed to achieve the highest levels of sustained immunity [5,6].

In a recent national study of adolescents up to age 17 years, only 43% of female and 38% of male youth had completed the 3-dose vaccine series in 2016 [7]. Data on vaccination patterns specifically among SGM youth are limited, and existing data suggest particularly low vaccine completion rates [8–12]. SGM youth

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https://doi.org/10.1016/j.vaccine.2018.06.057
0264-410X/

have elevated risk for HPV-related disease due to factors such as higher HPV prevalence [13,14], number of sexual partners [15], HIV-infection [14], and receptive anal intercourse [16]. In 2014, one study documented that only 32% of lesbian and bisexual women (ages 18–26 years) who initiated the series completed all 3 doses [12]. Data available for MSM and transgender women document vaccine completion for those who initiate the series ranging from 40% to 54% for MSM [8,10] to 37% for young MSM and transgender women ages 18–26 years [11].

SGM face different challenges in health care uptake compared to their non-SGM peers [17–20]. Special attentiveness to the unique health care needs [21,22] of this population is necessary for addressing health disparities and determining care delivery methods to provide optimal vaccine and preventive services. Some studies have investigated predictors and rates of HPV vaccination separately among lesbian/bisexual women, gay/bisexual men, or MSM and transgender women. We recently conducted a qualitative study of perspectives on barriers to and facilitators of HPV vaccination among SGM patients [23]. To our knowledge, no studies to date have investigated factors associated specifically with HPV vaccine completion in a broadly inclusive sample of SGM patients. This study is the first to comprehensively explore associations of sociodemographics, mental health factors, and engagement in care with 3-dose HPV vaccine completion in a broad sample of SGM young adults. We conducted this investigation via systematic electronic health record (EHR) audit at an SGM-focused health center.

2. Methods

2.1. Study design

All data were drawn retrospectively from existing EHRs of eligible patients at Fenway Health, an urban Federally Qualified Health Center in Boston, MA. This health center focuses on care needs of SGM patients [21]. Eligible records were from patients ages 18–26, self-identified as SGM, with EHR documentation of being offered the HPV vaccine during the study period, which was between April 1, 2011 and March 31, 2016 (inclusive). Data collection occurred over 3 months (September to December of 2016).

We used an automated simple random sampling algorithm [24] to select 358 records from the overall pool of 1933 SGM patient records who fit the eligibility criteria. We sought to examine characteristics of patients who had the opportunity to complete vaccination within the study period, therefore we excluded those who had <3 appointments within the study period (57 total) or received their 1st or 2nd HPV vaccine dose after October 1st, 2015 (25 total) and did not have at least 6 months to complete their 3-dose HPV vaccine regimen. Thus, the final cohort for analyses included 276 patients, of whom only one individual had declined vaccine initiation.

2.2. Measures

Data were retrieved from the EHR through a combination of automated Structured Query Language (SQL) queries by S.U. and manual audit by A.S.K and K.Z.A. from September to December 2016. Automated SQL queries retrieved partial or complete data, from patients' EHRs into a Microsoft Access Database, on variables related to sociodemographics (e.g. race/ethnicity, sex at birth, current gender identity, sexual orientation, highest education level), mental health (e.g. psychiatric disorders, substance use/misuse), engagement in care (e.g. primary care appointments, STI screening visits) and HPV vaccination (i.e. vaccination date and number). These variables are located in patient registration forms, problem lists, flowsheets, or the appointments fields in the EHR. We systematically performed manual audits of these forms and fields to complete and confirm the dataset initially collected via automated SQL queries. Variables were carefully defined with specific parameters and retrieved via pre-determined systematic guidelines to eliminate potential bias during data extraction from the EHR [25,26].

All EHR data at Fenway Health are recorded by trained health center providers and/or staff. Sociodemographic information is recorded in the EHR at registration and/or during provider visits based on patient report. The remaining data included in our analysis (i.e., mental health, engagement in care, and vaccine data) are recorded in the EHR by providers and staff during points of patient engagement, within chart notes (i.e., office visits, phone calls, or secure messaging), problem lists, flowsheets, and appointment records. The data related to mental health variables were manually retrieved from health records by reading patients' problem lists, which include diagnoses for psychiatric disorders with ICD-10 codes, and by reading patients' visit notes to determine whether their providers documented that they met diagnostic criteria for these disorders based on DSM-5.

Predictor variables collected from the EHR pertained to: (1) sociodemographics, (2) mental health, and (3) engagement in care. Details of these variables are included in Table 1. The outcome variable was completion of the 3-dose HPV vaccine series. The patients who obtained all 3 doses of the vaccine were included in the "Complete" category, whereas patients who obtained <3 doses were included in the "Incomplete" category.

The term "current" refers to characteristics present or absent during the study period from April 1, 2011 to March 31, 2016, and the term "lifetime" refers to the presence or absence of characteristics at any time. We examined possible associations of these factors with 3-dose vaccine completion. The study received Institutional Review Board approval prior to data collection.

2.3. Data analysis

Data analysis was conducted in 2017–2018. We used descriptive statistics to analyze the distribution of all variables (mean, standard deviation, and frequency) and stratified patients based on completion of the 3-dose HPV vaccine series ('complete' vs. 'incomplete').

We used bivariate tests to compare patients with complete vs. incomplete vaccination. We used Pearson correlations for continuous variables (e.g. age, percentage of primary care appointments completed, and number of STI screening visits). For categorical variables, we used Pearson's Chi-Square (X^2) tests to evaluate differences in observed and expected distributions by 3-dose completion. Fisher's exact tests were used for categorical variables when counts in distributions were < 5, to determine p-values in X^2 tests. To compare sample characteristics of these 276 patients with the overall pool of 1,933 eligible patients at the health center, we conducted a X^2 analysis on race/ethnicity [27–29]. We did not find any statistically significant difference at the $p < 0.05$ level between our sample and the overall pool of eligible patients in the proportion who identified as "White," "Black/African/American," "Latino/Hispanic," "Alaskan/Native American," "Asian/Pacific Islander," "Hawaiian Islander," "Multiracial," "Other," or "Not Identified."

We generated a binary logistic regression model with variables that: (1) had a p-value of <0.05 in bivariate analysis (i.e. highest education level; tobacco use during the study period; methamphetamine, crack/cocaine, opioid, benzodiazepine, IV drug, or other substance use disorder during study period and lifetime; percentage of primary care appointments completed; number of STI screening visits for HIV, chlamydia, gonorrhea, or syphilis during the study period), (2) were identified in the existing literature as potentially important for 3-dose completion (i.e., transgender