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Sociodemographic Differences in Human Papillomavirus Vaccine Initiation by Adolescent Males



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A B S T R A C T

Purpose: The purpose of this study was to describe patterns of human papillomavirus (HPV) vaccine initiation by males and characterize sociodemographic differences.

Methods: We conducted a retrospective cohort study of 11- to 18-year-old males in a large primary care network who had a preventive or acute visit between October 2009 and December 2013. Outcomes measured were HPV vaccine series initiation and initiation at the first eligible visit. Logistic regression measured independent associations between outcomes and sociodemographic characteristics, adjusting for potential confounders including visit frequency, insurance changes, and the presence of complex medical conditions.

Results: Of 58,757 eligible patients, most were white (57%) with private insurance (77%). During the study period, 39% of the cohort initiated the vaccine series, and 7% initiated at their first eligible visit. Black patients with private (adjusted odds ratio [aOR], 1.99; 95% confidence interval [CI], 1.73–2.30) and Medicaid insurance (aOR, 2.90; 95% CI, 2.56–3.30) had significantly higher odds of HPV vaccine initiation compared with white patients with private insurance. A similar trend was found for Hispanic patients with private (aOR, 1.45; 95% CI, 1.26–1.67) and Medicaid insurance (aOR, 2.15; 95% CI, 1.78–2.60). These differences were present both in the preroutine recommendation period (2009–2011) and the postroutine recommendation period (2012–2013).

Conclusions: Traditionally marginalized populations have higher odds of HPV vaccine initiation, both at the first eligible visit and overall. Although the true mechanism underlying these differences remains unknown, potential candidates include provider recommendation patterns and differential vaccine acceptance within these groups.

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IMPLICATIONS AND CONTRIBUTION

In this large cohort of males, racial/ethnic minorities and patients with Medicaid insurance were more likely to initiate the human papillomavirus vaccine series than white patients with private insurance, even after adjusting for factors such as visit frequency, site of care, and potential confounding by clinician.

Conflicts of Interest: A.G.F. is the co-principal investigator of an independent research grant from Pfizer for work unrelated to immunization delivery. To date, he has drawn no salary support. Pfizer does not manufacture an HPV vaccination product. The remaining authors have no conflicts of interest to report.

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The quadrivalent vaccine against human papillomavirus (HPV) is effective in preventing genital warts and precancerous anal lesions in males [1,2]. Although most of HPV-related illnesses occur among females, males can develop genital warts and penile, anal, and oropharyngeal cancers. Among the ~35,000 HPV-associated cancers per year in the United States, nearly 40% occur among males [3,4]. In addition, unlike cervical cancer, there are no routinely recommended screening procedures for HPV-related malignancies in males. HPV vaccination is therefore the best currently available option to prevent anogenital cancers in this group. The HPV vaccine was first approved for males in 2009, receiving a permissive recommendation for 9- to 21-year-olds from the Advisory Commission of Immunization Practices (ACIP) [5], followed by a routine recommendation in 2011. The vaccine is administered as a series of three intramuscular injections over 6 months. Receipt of at least one HPV vaccine dose is termed “initiation” and receipt of three doses is termed “completion.” Estimates of initiation among males have ranged from 1% to 35% in U.S. males [6,7].

Although multiple studies evaluating barriers to HPV vaccination among females have revealed sociodemographic differences in vaccine initiation [8–12], fewer studies have focused on sociodemographic predictors of HPV vaccine series initiation among males, especially among 11- to 12-year-olds. Other than higher initiation rates for Hispanic males compared with white males [13,14], socioeconomic and racial patterns in HPV initiation rates have yet to be clearly identified.

The objective of this study was to identify factors associated with HPV vaccine series initiation among males aged 11–18 years in a large primary care network and to characterize sociodemographic differences in initiation rates. As provider recommendation is known to be an important factor in HPV vaccine acceptance [13,15], we used electronic medical record data to adjust for different providers. We hypothesized that racial/ethnic minorities and those with Medicaid insurance would have higher rates of initiation than white patients or those with private insurance.

Methods

Study design

This was a retrospective cohort study of adolescent males who presented to a primary care network affiliated with a large metropolitan children’s hospital between October 20, 2009, and December 31, 2013. October was chosen to coincide with the permissive recommendation by the ACIP. All participating practices belong to the Pediatric Research Consortium, a practice-based research network that shares an electronic medical record system. Pediatric Research Consortium consists of 31 pediatric practices in rural, suburban, and urban locations in Pennsylvania and New Jersey. Three of the urban practices serve as teaching sites for a pediatric residency program. Inclusion criteria for the study included male sex, aged 11–18 years during the study period, and at least one visit to a primary care or adolescent clinic. Exclusion criteria included prior receipt of an HPV vaccine and documented yeast allergies (contraindication to HPV vaccine receipt). The study was reviewed and exempted by the Committee for the Protection of Human Subjects at The Children’s Hospital of Philadelphia.

Data sources

Data analysts extracted clinical and sociodemographic information including immunization and medical histories from the shared electronic medical record (EpicCare; Epic Systems Corporation, Verona, WI).

Outcomes

Our outcomes were vaccine initiation at the first eligible visit and vaccine initiation during the study period. The first eligible visit was defined as the first visit during the study period to a primary care or adolescent clinic after the age of 11 years but before initiation. To address possible care outside the primary care network among older study participants, we measured the time between the first eligible visit and the visit immediately prior for individuals aged 13–18 years.

Exposures of interest

The primary exposures of interest were race/ethnicity and insurance status. Race is self-reported as black or African-American, white, Asian, American Indian/Eskimo/Alaskan, Native Hawaiian/Pacific Islander, other, or refused. Ethnicity is self-reported as Hispanic, non-Hispanic, or refused. We classified patients as non-Hispanic black, non-Hispanic white, Hispanic, non-Hispanic other, or unknown. Using a standard algorithm, subjects’ insurance plans were categorized as private, Medicaid, or self-pay. Medicaid insurance status was determined by inspecting the insurance plan and matching to known Medicaid insurance payers in the region. A separate code was used to identify self-pay patients. All other insurance payers were categorized as private.

Other clinical data collected include the following: patient age at cohort entry; dates of tetanus, diphtheria, acellular pertussis vaccine (Tdap) and meningococcal conjugate vaccine (MCV4); and the presence of complex chronic medical conditions based on previously validated International Classification of Disease-9 code-based definitions for nine different categories of chronic diseases [16]. Encounter and practice data included visit dates, practice, practice type (teaching vs. nonteaching), provider type, and authorizing provider ID. Provider type was categorized as physician versus nurse practitioner/physician assistant versus other (e.g. nurses, social workers).

Data analysis

Descriptive statistics were calculated for exposure and outcome variables. Variables were summarized with proportions (categorical) or means/medians (continuous). Unadjusted odds ratios and 95% confidence interval (CI) were calculated using logistic regression. Exposure variables with a significant bivariate association ($p < .05$) with the outcome variable were included in a multivariate logistic regression model, which produced adjusted odds ratios (aORs). Because patients are grouped within practice locations and provider, we adjusted for clustering using the robust sandwich estimator [17]. Since the primary care network cares for a large population of racial/ethnic minority groups with public insurance, an interaction term between race/ethnicity and insurance was planned *a priori*. Using the final multivariate model, we calculated predicted probabilities of vaccine initiation to demonstrate the interaction between race/ethnicity and insurance

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