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Measuring Adolescent Human Papillomavirus Vaccine Coverage: A Match of Sexually Transmitted Disease Clinic and Immunization Registry Data

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A B S T R A C T

Purpose: Human papillomavirus (HPV) vaccine is recommended for adolescents. By the end of 2013, 64% of female and 40% of male New York City residents aged 13–18 years had received ≥1 HPV vaccine dose. Adolescents attending sexually transmitted disease (STD) clinics are at high risk for HPV exposure and could benefit from vaccination. Our objective was to estimate HPV vaccination coverage for this population.

Methods: We matched records of New York City's STD clinic patients aged 13–18 years during 2010–2013 with the Citywide Immunization Registry. We assessed HPV vaccine initiation (≥1 dose) and series completion (≥3 doses among those who initiated) as of clinic visit date and by patient demographics. We compared receipt of ≥1 dose for HPV, tetanus-diphtheria-acellular pertussis, and meningococcal conjugate vaccine.

Results: Eighty-two percent of clinic attendees (13,505/16,364) had records in the Citywide Immunization Registry. Receipt of ≥1 HPV dose increased during 2010–2013 (females: 57.6%–69.7%; males: 1.5%–36.3%). Among females, ≥1-dose coverage was lowest among whites (53.4%) and highest among Hispanics (73.3%); among males, ≥1-dose coverage was lowest among whites (6.9%) and highest among Asians (20.9%). Series completion averaged 57.7% (females) and 28.0% (males), with little variation by race/ethnicity or poverty level. Receipt of ≥1 dose was 59.7% for HPV, 82% for tetanus-diphtheria-acellular pertussis, and 76% for meningococcal conjugate vaccines.

Conclusions: HPV vaccine initiation and completion were low among adolescent STD clinic patients; coverage was lower compared with other recommended vaccines. STD clinics may be good venues for delivering HPV vaccine, thereby enhancing efforts to improve HPV vaccination.

IMPLICATIONS AND CONTRIBUTION

From matched clinic- and population-based immunization registry records among an adolescent population at high risk for human papillomavirus exposure, this study found that HPV vaccine coverage was suboptimal and similar to citywide estimates. Better efforts by all providers of adolescent care are needed to ensure universal, timely, and complete HPV vaccination.

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The Advisory Committee on Immunization Practices (ACIP) has recommended routine vaccination with the human papillomavirus (HPV) vaccine since June 2006 for girls and October 2011 for boys. Current recommendations are for vaccination with three doses at age 11 or 12 years, and for those not previously vaccinated, through age 26 years for females, age 21 years for males, and age 26 years for males who have sex with other males [1–3].

In 2013, national survey estimates for receipt of at least one dose of HPV vaccine (vaccine initiation) were 57.3% for females and 34.6% for males aged 13–17 years old; 37.6% of females and 13.9% of males received all three doses [4]. In New York City (NYC), vaccine coverage estimates consistently exceed the national average. Corresponding NYC survey-based estimates for female and male vaccine initiation in 2013 were 64.2% and 46.2%, respectively; 45.2% of females and 29.6% of males received all three doses [5]. Based on data in the Citywide Immunization Registry (CIR), 64% of females and 44% of males aged 13–18 years in NYC had received one dose, and 40% of females and 19% of males had received all three doses of HPV vaccine by the end of 2013 (V. Papadouka, personal communication, November 20, 2015).

HPV vaccine recommendations target adolescent girls and boys, ideally before they become sexually active and are exposed to HPV. Adolescents seeking care at sexually transmitted disease (STD) clinics have substantial prevalence of STDs, including HPV [6], and might be considered unlikely to benefit from HPV vaccination. However, Dunne et al. [7] reported that most 14- to 26-year-old women attending STD clinics did not have evidence of infection or prior exposure to at least one of four HPV vaccine types and that almost half did not have evidence of infection or prior exposure to any of the four vaccine types, suggesting that vaccination of STD clinic populations could be beneficial. Most STD clinics do not routinely vaccinate for HPV due to barriers such as vaccine cost, reimbursement, staff time constraints, parental consent requirements, and the need for scheduled follow-up visits to administer multiple doses [8].

The NYC Department of Health and Mental Hygiene (DOHMH) operates eight public STD clinics where STD diagnosis and treatment and HIV testing services are offered to persons over the age of 12 years without parental consent, or proof of immigration or insurance status. As of the time of this study, HPV vaccine was not offered in NYC STD clinics. The STD clinics serve a substantial adolescent population; 16,593 patients seen in the clinics between 2010 and 2013 were between 13 and 18 years old. To assess HPV vaccination coverage among STD clinic attendees and compare it to other vaccine coverage estimates, we matched a cohort of adolescents attending NYC STD clinics against the NYC immunization registry.

Methods

The New York State and NYC Health Codes require providers to report all immunizations given to children and adolescents younger than 19 years [9]; immunizations of persons vaccinated in NYC have been reported to the CIR since 1996. As one of the Centers for Disease Control and Prevention's sentinel sites for monitoring national immunization trends, the CIR meets high standards of completeness and timeliness [10]. In 2013, the CIR captured over 90% of the childhood and adolescent population with ≥2 immunizations against any disease. In addition, 94% of pediatric immunizers reported regularly to the CIR, and approximately 92% of immunizations were reported within 1 month of administration [11].

In February 2014, we matched to the CIR all 16,364 adolescents (11,153 females and 5,211 males) seen at NYC DOHMH STD clinics between January 2010 and December 2013 who were aged 13–18 years at the time of clinic visit. Key matching variables included first name, last name, birthdate, gender, mother's maiden name, and all addresses recorded in STD clinic records. CIR's probabilistic matching system thresholds were set at .96 for a match and .70 for a nonmatch [12]. STD clinic records that matched to immunization records with a match probability of .96 or above were considered definite matches; those with match scores between .71 and .95 were considered potential matches, and these underwent human review for final determination.

We calculated HPV vaccination coverage based on HPV vaccine doses reported to the CIR, counting receipt of any bivalent or quadrivalent vaccine dose. We examined receipt of ≥1, ≥2, and ≥3 doses (some individuals had >3 HPV vaccine doses recorded in the CIR), and 3-dose vaccine series completion, defined as the proportion of adolescents who received ≥3 doses among those who had ≥1 HPV vaccine dose and who had 24 weeks of elapsed time (the accepted minimum interval between first and third doses [13]) between the first dose and the STD clinic visit date.

We assessed vaccination coverage for female and male adolescents by year of clinic visit, age, race/ethnicity, and neighborhood-level poverty status. For coverage by year, adolescents with multiple clinic visits during the study period could contribute to multiple calendar years but only once per year; we counted vaccine receipt status as of the date of the last visit to the STD clinic in a given year. For coverage by age, we counted vaccine receipt as of the date of an adolescent's last STD clinic visit in 2013; an adolescent with multiple visits in 2013 whose birthday fell between visits could contribute to two age groups. Neighborhood-level poverty (proxy for individual socioeconomic status as individual-level data were unavailable) was defined as the percent of the population in a given census tract whose household income was below the federal poverty level. Patients were assigned neighborhood poverty levels according to their last address in STD clinic records, using standard cut points for neighborhood-level poverty categories in NYC [14]. Analyses by race/ethnicity and poverty level were patient based, with HPV vaccination coverage assessed as of the last visit during 2010–2013.

Finally, we calculated proportions of adolescents with STD clinic visits in 2013 who had received ≥1 dose of two other vaccines that ACIP recommends for this age group (tetanus, diphtheria, and acellular pertussis [Tdap] vaccine [on or after age 7 years], and meningococcal conjugate [MCV4] vaccine), and compared those to the proportion with ≥1 dose of HPV vaccine by that year. We also calculated the proportion of 13- to 15-year-old females with ≥3 HPV doses by 2013 for comparison to the *Healthy People 2020* target of 80% [15].

Z tests were used to assess differences in vaccination coverage by race and ethnicity (reference group: non-Hispanic whites) and poverty level (reference group: adolescents living at <5% below the federal poverty level); results were considered statistically significant at $p < .05$. Analyses were conducted with SAS, version 9.1 (SAS Institute, Cary, NC). The NYC DOHMH Institutional Review Board determined that this project was public health surveillance that was nonresearch.