

Association between Maternal Preventive Care Utilization and Adolescent Vaccination: It's Not Just About Pap Testing

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ABSTRACT

Study Objective: To examine the association between maternal preventive care utilization and human papillomavirus (HPV) vaccine uptake by their adolescent daughters.

Design: A cross-sectional study using immunization records from administrative claims and the state health department's immunization information system from June 2006 through May 2011.

Participants: Commercially-insured Michigan females aged 13-17 in May 2011 and their mothers. Mothers were identified using relationship information on the insurance contract.

Main Outcome Measures: Using logistic regression, we investigated whether initiating and/or completing the HPV vaccine series were associated with maternal preventive care utilization (Papanicolaou testing, mammograms, primary care office visits) independently and using a combined maternal preventive care utilization index.

Results: Among 38,604 mother-daughter pairs, 36% of daughters initiated and 22% completed the HPV vaccine series. Maternal utilization of each recommended service was modestly associated with both daughter's initiation and completion of the HPV vaccine. Effect estimates for receipt of Papanicolaou test on vaccine initiation (OR = 1.07, 95% CI = 1.06-1.08) were not any higher than for mammograms (OR = 1.10, 95% CI = 1.08-1.11) or primary care office visits (OR = 1.07, 95% CI = 1.06-1.09). Using a maternal preventive care utilization index, vaccine uptake increased with an increasing number of received services.

Conclusions: Maternal receipt of recommended preventive care, which may reflect general attitudes toward prevention, is as or more predictive of daughter's vaccination status than cervical cancer screening alone. Engaging women in broad routine preventive care practices may have additional positive effects on adolescent HPV vaccination beyond those achieved through cervical cancer prevention efforts alone.

Key Words: Human papillomavirus, HPV vaccine, Vaccine uptake, Adolescents, Family, Clinical preventive services, Cancer screening and prevention

Introduction

Human papillomavirus (HPV) infections are the most common sexually transmitted infections (STIs) in the United States.¹ While not all HPV infections are associated with cancer, 2 serotypes alone are responsible for approximately 70% of all cervical cancer cases.^{2,3} Highly effective⁴⁻⁶ prophylactic vaccines protecting against HPV infection were licensed and recommended for use in adolescent females starting in June 2006. It is theorized that widespread uptake of HPV vaccination could drastically reduce HPV infections and the public health burden of cervical cancer⁷; however, data from the first few years of vaccine availability suggest that current levels of uptake in the United States are sub-optimal for meeting the goal of widespread vaccination.⁸ Estimates of HPV vaccine uptake vary by setting and data collection method,⁹⁻¹¹ but are consistently low. Among adolescent females, ages 13 through 17 years, the 2011 National Immunization Survey (NIS-Teen) estimates that only 53% had initiated the HPV vaccine series and that only

35% had completed the 3-dose series.⁸ Studies aimed at elucidating the factors associated with vaccine uptake are needed to inform development of evidenced-based interventions to improve current rates.

Vaccination of minors requires parental consent and mothers are generally the primary parent to make health-care decisions.¹² In addition, parental attitudes and behaviors, especially maternal, may play a significant role in the decision to vaccinate. Several studies observed associations between women's healthcare utilization related to sexual health, such as Papanicolaou (Pap) and STI testing, and acceptability of HPV vaccination.¹³⁻¹⁶ However, studies have found mixed results when investigating the association between HPV vaccine acceptability and mothers' experiences with HPV-related diseases and other STIs, with the majority showing no statistically significant association.^{13,14,17-21} This suggests that maternal decisions about vaccination are more related to their propensity to receive preventive care than personal experience with the disease in question. To understand the role of maternal preventive care utilization on adolescent HPV vaccination, we investigated the association between maternal use of preventive care (related and unrelated to sexual health), and uptake of the HPV vaccine by their daughters. In addition, we combined maternal preventive care data into a preventive care

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utilization index; an approach used by at least 1 other study to examine propensity to receive preventive care.²² To our knowledge, no previous studies have directly examined maternal general preventive care utilization, unrelated to sexual health, and HPV vaccination, either singularly or in combination.

Materials and Methods

Study Population

We conducted a cross-sectional analysis of 38,604 females ages 13 through 17 years in May 2011 and their mothers, using data collected from June 2006 (when the first HPV vaccine was licensed) through May 2011. To be eligible for the study, adolescent females had to be Michigan residents continuously enrolled in a commercial preferred provider organization (PPO) for the entire data collection period.

We used PPO membership data to identify mothers of these adolescent females; defined as female insurance subscribers or spouses on the adolescent's contract who were between 15 and 44 years older than the adolescent. If no potential mother or multiple potential mothers were identified for an adolescent, the adolescent was excluded from the study. We also excluded mothers and daughters with incomplete demographic information, including those without household level information on race, income, or education (Fig. 1).

Data Sources

Data were obtained from the following sources: (1) PPO claims data, (2) Michigan Care Improvement Registry (MCIR), (3) health plan-derived household demographic data,²³ and (4) Health Resources and Services Administration's Primary Care Service Area (PCSA) Data, 2006 edition. We used PPO claims data to identify HPV immunizations and other services received by the mothers and daughters. Because costs for the vaccine and the maternal preventive services under review are not incidental expenditures, these services are likely billed to the health plan and captured in administrative claims; however, the completeness of claims data for use in identifying HPV immunizations has not been evaluated. We supplemented claims information with data from the MCIR, the state immunization information system (IIS). The MCIR collects data from the vast majority of public and private vaccine provider sites in Michigan. As of 2011, the MCIR received 2 or more adolescent vaccination records for 73% of adolescents aged 11 through 17 years, which suggests that most vaccinations are reported.²⁴ We used this IIS to identify immunizations paid out-of-pocket or through another payer, and thus unavailable in PPO claims data.

We included household demographic information, including primary race/ethnicity, highest education, and income. We incorporated PCSA data to account for differences in primary care physician accessibility by region.²⁵ PCSAs are aggregated zip code tabulation areas, sourced from the 2000 Census, that reflect where Medicare patients

seek primary care. PCSAs are similar to hospital service areas and hospital referral regions, but are more relevant to this study because of their focus on primary care rather than hospitals. For families whose zip code could not be matched to a valid PCSA (<3% of families), we used the nearest numerical zip code to identify a PCSA.

Outcomes

Our 2 outcomes of interest were (1) HPV vaccine series initiation (at least 1 dose) and (2) vaccine series completion (3 or more doses) during the data collection period. Doses were identified either through PPO claims or the MCIR as American Medical Association's Current Procedural Terminology (CPT) codes 90649 or 90650 or the Centers for Disease Control and Prevention's vaccine administered code 137. Doses administered within 5 days of a previous dose were excluded from the analysis (<1%) to account for possible duplicates due to date entry errors in the MCIR or PPO claims. We considered adolescents as having completed the vaccine series if 3 doses were received, regardless of whether the timing between doses met the Advisory Committee on Immunization Practices guidelines,²⁶ given that the focus of this study was to examine vaccination behavior rather than likelihood of protection from the virus; however, more than 98% of included doses were administered according to the guidelines.

Maternal Preventive Care Utilization

Predictors of maternal preventive care utilization included (1) receiving a recommended Pap test in the 3 years between June 2008 and May 2011, (2) receiving a recommended mammogram in the 2 years between June 2009 and May 2011, and (3) seeing a primary care physician (PCP) or obstetrician/gynecologist (OB/GYN) for an office visit between June 2009 and May 2011. Pap test and mammogram measures were based on the 2011 Healthcare Effectiveness Data and Information Set (HEDIS) Specifications.²⁷ Women were considered eligible for Pap testing if they were between the ages of 24 and 64 in May 2011, were continuously enrolled in the PPO, and had no prior claim indicating a hysterectomy since October 2005. To be eligible for a mammogram, women had to be between 42 and 64 in May 2011, continuously enrolled in the PPO, and have no prior claim indicating a bilateral mastectomy since October 2005. Receipt of Pap testing and/or mammograms were identified through claims data and followed HEDIS definitions for continuous enrollment.

All women were considered eligible for PCP or OB/GYN office visits, based on American College of Obstetricians and Gynecologists recommendations for annual well-woman visits.²⁸ Office visits included CPT codes for office/outpatient visits (99201–99215) or preventive visits (99381–99397) with a practicing PCP or OB/GYN and are henceforth referred to as primary care office visits. These 3 predictors were combined to create the maternal preventive care utilization index, based on the count of received services. We stratified mothers based on the number of services they

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