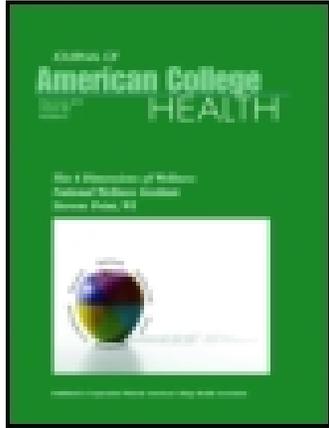


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Sex Differences Among College Students in Awareness of the HPV Vaccine and Vaccine Options

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Brief Report

**Sex Differences Among College Students in Awareness of the HPV Vaccine and Vaccine
Options**

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Abstract:

Objectives: To explore awareness of HPV and use of HPV vaccines (Gardasil® and Cervarix®) by college students.

Participants: The sample was comprised of 817 undergraduates at two northeastern U.S. universities; they participated between February and May, 2010.

Methods: Students were provided with a link to an anonymous, self-administered, web-based survey comprised of 76 questions. The survey included questions about health behaviors, awareness and knowledge of HPV and the two HPV vaccines, and vaccine uptake.

Results: Results indicate high levels of awareness of HPV as well as marked **sex** differences related to vaccine awareness and uptake. Both **sexes** are largely unaware of Cervarix® and the differences between Cervarix® and Gardasil®.

Conclusion: The study affirms the importance of a clinician's recommendation for HPV vaccination. Public health messaging should become more inclusive of adolescent and young adult males. College students' awareness of HPV vaccine options mirrors Gardasil's market dominance in the United States.

In June 2006, the Food and Drug Administration (FDA) approved the quadrivalent human papilloma virus (HPV) vaccine (Gardasil®, Merck) for females ages 9 to 26 years. Gardasil® protects against infection with HPV types 16 and 18, which are responsible for ~70% of cervical cancer cases, as well as types 6 and 11 which account for 90% of genital warts.¹ In October 2009, the FDA expanded use of Gardasil® to include males ages 9 to 26 years and also approved a bivalent vaccine (HPV 16/18; Cervarix®, GlaxoSmithKline) for girls and women ages 10 to 25 years. The Advisory Committee on Immunization Practices (ACIP) has not expressed any preference for Gardasil® or Cervarix®, maintaining that two vaccine producers in the U.S. market would potentially strengthen efforts to prevent cervical cancer, and that cervical cancer prevention is a higher priority^{2,3} despite the substantial adverse consequences of anogenital cancers and precancers, as well as genital warts.^{4,5} To our knowledge, this report is the first to examine college students' understanding and preferences regarding these two HPV vaccines.

Methods

During the 2010 spring semester, a cross-sectional survey was administered to a convenience sample of 817 undergraduate students at two northeastern U.S. universities. The internet-based, anonymous survey included 76 items (demographics, health behaviors, knowledge of HPV, and perceptions and use of the HPV vaccines (HPV2, Cervarix®; HPV4, Gardasil®). IRB approval was granted prior to the start of data collection. Informed consent was obtained by providing a consent form for participants to read before taking the survey. The consent form explained the nature of the survey, that participation is voluntary, and that responses

would be kept anonymous. Students indicated consent by clicking on a link to proceed to the survey. At one institution (n=389) the survey was available to students through a psychology research website that was only accessible to introductory psychology (PSY 101) students using a secure login. Students at the other institution (n=428) gained access to the survey website through the direction of their instructors in selected general education courses. Respondents were granted either some form of course credit or research credits.

Descriptive statistics and chi-square tests ($p < .05$) were used to compare responses for males and females. The mean age of participants was 19.5 years, 55% were male, and 5% were Hispanic. The non-Hispanic students were 83% White, 5% Black/African American, 9% Asian, and 3% Other/Multi-racial. The vast majority of students (95% of females, 98% of males) reported only having sexual partners of the opposite sex.

Results

Figure 1 summarizes awareness of HPV and self-reported use of HPV vaccines by sex. Awareness of HPV was high among both sexes, reaching 90.0% for females. Females reported significantly greater awareness of HPV, the HPV vaccine, and Gardasil®; significantly more discussions with their clinician about the HPV vaccine; and significantly higher rates of HPV vaccination. They also endorsed HPV vaccine safety more strongly than males. Few respondents of either sex (<20%) had heard of Cervarix®.

In response to the survey item, “*There are two HPV vaccines available: a bivalent vaccine (Cervarix®, GSK) and a quadrivalent vaccine (Gardasil®, Merck). Do you feel that either one of these vaccines is better than the other?*,” only 13% of females indicated that one

vaccine was better than the other, including 11.9% who chose Gardasil®. About two-thirds (65.1%) reported that they didn't know which vaccine was better and 21.9% thought there was "no difference." When asked, "*If you had a preference, which one would you choose?*," 59% of females selected "whatever my doctor recommends." Among those who did identify a preferred vaccine, 27.6% chose Gardasil® and 1.6% selected Cervarix.® Similarly, 84% of males did not know which vaccine was better and 60% would follow their clinician's recommendation for choice of HPV vaccine.

Comment

The large proportion of college students who indicated that they are familiar with HPV is encouraging from both health education and public health perspectives. The high levels of vaccine awareness, discussions with healthcare providers, and perceptions of vaccine safety among female students are also a positive development. In contrast, the much lower level of awareness of the HPV vaccine among male students, along with very few discussions with healthcare providers and relatively low perceptions of vaccine safety, are concerning, especially in light of research indicating increasing rates of HPV-related cancers among young men in the United States.⁶

College females were also much more likely to have heard of Gardasil® than college males. In contrast, less than 20% of both females and males reported having heard of Cervarix, suggesting more limited awareness of the disease prevention differences between these products. There are at least two possible explanations for this limited knowledge. Merck has promoted Gardasil® to female patients, their families, and clinicians since 2005, which may explain the

greater awareness of Gardasil® among female respondents. Secondly, despite the ACIP's decision to not express a preference for either Gardasil® or Cervarix®, clinicians may be promoting use of Gardasil® based on either the additional protection against genital warts, its labeled use to protect against other anogenital malignancies, a longer market presence, and/or availability for use in both males and females, which simplifies vaccine stocking. Others studies have reported a consumer preference for vaccines which protect against both genital warts and anogenital cancers.^{7,8} Related to this, a review of US-based sales figures reveals that Gardasil® accounted for between 70% and 86% of all HPV vaccine sales each calendar year from 2009 to 2012.⁹ Merck's new 9-valent HPV vaccine has recently completed phase III studies and will protect against ~90% of cervical cancer cases and genital warts.¹⁰ This 9-valent vaccine, which will supplant the 4-valent vaccine, will serve to further differentiate available HPV vaccines for physicians and consumers.

Two-thirds (67.3%) of female respondents and 8.5% of male respondents in this survey reported receiving at least one dose of the HPV vaccine and 58.6% and 6.5% of females and males, respectively, had completed the 3-dose series. National estimates of HPV vaccination rates among persons ages 19-26 years remain suboptimal. Coverage with one or more doses of the HPV vaccine among females ages 19-26 years was 20.7% and 34.5% in 2010 and 2012, respectively, while comparable rates for more than one dose of the HPV vaccine in males of the same ages were 0.6% and 2.3%, respectively.^{11,12} More recent surveillance data among adolescents ages 13-17 years old indicate that HPV vaccination coverage (one or more HPV doses) increased significantly from 53.8% in 2012 to 57.3% in 2013 among females and from 20.8% (2012) to 34.6% (2013) among adolescent boys; coverage rates for the 3 dose series also

increased significantly to 37.6% and 13.9%, respectively, among females and males.¹³ Despite this recent modest progress, HPV vaccination rates for adolescents still lag far behind those for the two other vaccines also recommended for adolescents by the ACIP, the meningococcal (MenACWY) and Tdap vaccines.¹⁴ While the product inserts for both HPV vaccines recommend completion of a full 3-dose series, recent publications have reported non-inferior antibody responses to a 2-dose series administered at 0 and 6 months for HPV2¹⁵ and for HPV4¹⁶. Also a post-hoc analysis of the Costa Rica clinical trial data reported that antibody levels in response to one or two doses of HPV2 vaccine were much higher than following natural infection through four years of follow-up.¹⁷ However, the duration of protection is uncertain at these reduced dose schedules and the Advisory Committee on Immunization Practices (ACIP) continues to recommend a 3-dose schedule in the United States.

Limitations

The cross-sectional survey design does not permit conclusions regarding causal relationships. Also, the limited diversity of the sample in terms of race, ethnicity, race, and sexual orientation does not allow for comparisons across these groups. This study is unique in examining college student preferences for a particular HPV vaccine.

Conclusions

The study supports several conclusions. First, given the high percentages of both male and female respondents whose choice of vaccine would be based on their provider's recommendation, it affirms the importance of a clinician's role in promoting HPV vaccination. Second, messaging about the HPV vaccine should continue to emphasize the benefits of HPV

vaccination for all persons ages 9-26 years while specifically targeting males to address the vaccination disparity. Given the optimal effectiveness of these preventive HPV vaccines when administered prior to exposure (e.g., HPV naïve), efforts should focus on vaccinating preteens and adolescents, as well as completing catch-up vaccination for young adults. Third, college students' higher awareness of Gardasil® than Cervarix® likely reflects Gardasil's dominance in the U.S. vaccine market, greater visibility in consumer-directed advertising, and/or physician and patient preferences. Fourth, college students may be more attuned to HPV-related disease risk and the importance of preventive care than adolescents, and/or their slightly older age may have provided additional opportunities for HPV vaccine completion. Moreover, these findings support the need to more actively target awareness and health education messaging leading to completion of the full three-dose HPV series among both sexes.

Note

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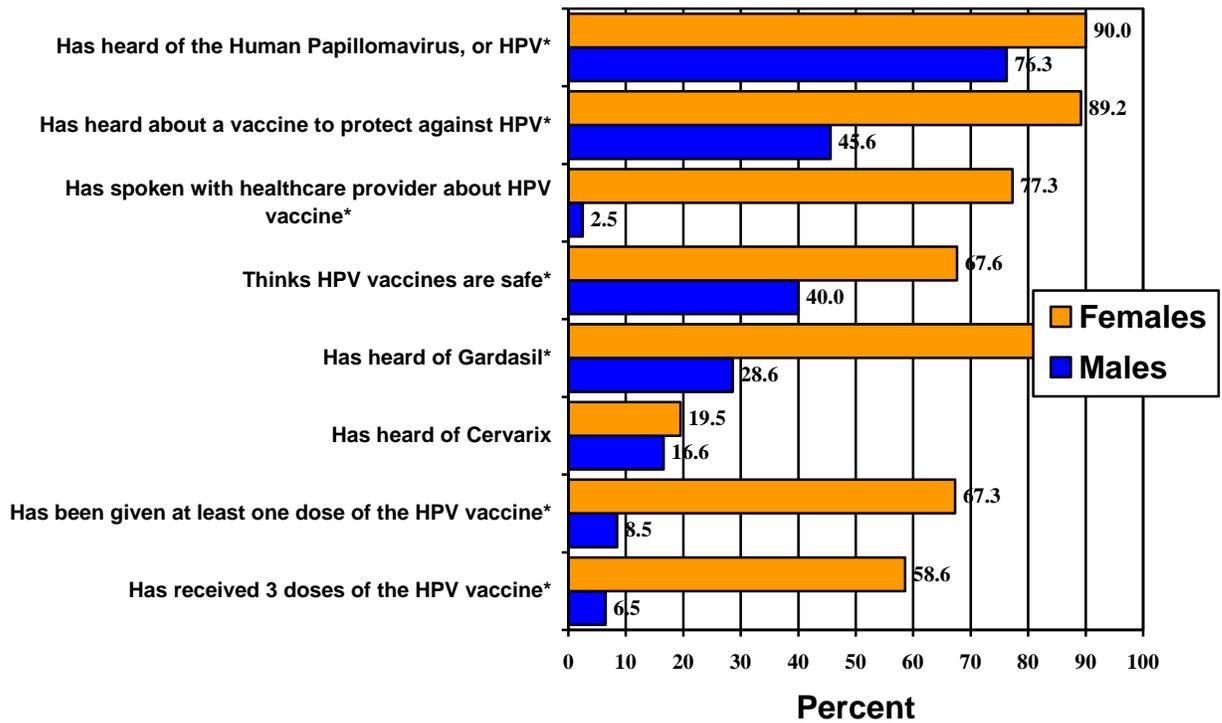


Figure 1. College student awareness of human papillomavirus (HPV) and use of HPV vaccine, by sex. * $p < 0.05$.