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Accuracy of Self-Reported Human Papillomavirus Vaccine Receipt Among Adolescent Girls and Their Mothers

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A B S T R A C T

Purpose: The use of self-report of human papillomavirus (HPV) vaccination status has several implications for clinical care and research. Reports of HPV vaccination history of adolescent girls (ages: 14–17 years) and their mothers were compared with medical chart data to assess the accuracy of HPV vaccine recall.
Methods: Adolescent girls (N = 74) and their mothers independently completed questionnaires regarding HPV vaccination history, which were compared with medical chart data to assess the accuracy of HPV vaccine recall.
Results: There were high levels of inaccuracy between actual HPV vaccination and self-report of vaccine receipt. Both mothers and daughters had poor recall of HPV vaccination, and were more likely to underestimate than overestimate the coverage. Girls who accurately reported their vaccination status were not more likely to have been sexually active in the past 2 months ($p = .75$).
Conclusions: These findings have clinical and research implications, as self-report is relied on to assess young women's vaccination status in research settings or in the absence of medical records. These data address the still prevalent concern that HPV vaccination encourages adolescent sexual behavior. It is unlikely that sexual behaviors will change as a result of vaccination in the large percentage of girls who cannot recall being vaccinated.

Adult self-report of vaccination status has been demonstrated to be variably accurate for several different vaccines [1–6]. Generally, recall of vaccines has high sensitivity and reasonable specificity, but findings have differed depending on the type of vaccination and on certain demographic characteristics. There is limited research on the accuracy of self-reported vaccination status in adolescents, specifically regarding human papillomavirus (HPV) vaccination.

Understanding HPV vaccination status has research and clinical implications. In many research studies, and in some instances within clinical practice, self-reported vaccination status is relied on to obtain immunization history and inform the need for further vaccinations [5]. The present study used medical records and self-administered questionnaires to compare actual HPV vaccination status with self-reported and parent-reported receipt of HPV vaccine among adolescent girls in an urban setting.

Methods

Adolescent girls (N = 74; ages: 14–17 years at enrollment) and their female guardians (referred as mothers in the present study) were recruited from urban adolescent clinics over a 5 month period. The mothers and girls each completed a questionnaire regarding sexual behaviors, attitudes, and knowledge about HPV vaccine. The research assistant was present during the administration of the survey to ensure that the girls and their mothers did not converse while completing the questionnaire. Adolescent girls were asked to recall whether they had received

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Table 1
Sensitivity and specificity of girls' and mothers' self-reported HPV vaccination status for the first dose of vaccine (n = 74)

Reported vaccine status (≥ 1 dose)	Medical records		Predictive values
	Vaccine	No vaccine	
Girls' self-report			
Vaccine	36	0	PPV = 1.0
No/unknown vaccine	30	8	NPV = .21
	Sensitivity = .54	Specificity = 1.0	Percentage agreement = 59.5
Mothers' reported vaccine status (of daughter)			
Vaccine	50	0	PPV = 1.0
No/unknown vaccine	16	8	NPV = .33
	Sensitivity = .76	Specificity = 1.0	Percentage agreement = 78.4

HPV = human papillomavirus; PPV = positive predictive value; NPV = negative predictive value.

one or more doses of HPV vaccine and the approximate date(s) of the shot(s). Mothers were asked parallel questions about daughters' HPV vaccination histories. Both were asked to complete an 18-item HPV knowledge scale, adapted from a past study [7]. Medical records were abstracted for vaccine dates to compare HPV vaccine recall with actual receipt of one or more doses of vaccine. Analysis of variance was conducted on knowledge scores to compare mothers and daughters who accurately reported vaccination status with those who did not, and χ^2 analysis was used to assess frequency of sexual behaviors and girls' accuracy of self reports. Sensitivity, that is, the proportion of participants who reported a history of receiving one or more HPV vaccine doses in agreement with the daughter's medical record, and specificity, that is, the proportion of participants who reported a history of not receiving HPV vaccination in agreement with the daughter's medical record, were calculated for mothers and daughters.

Results

A total of 74 girls aged 14–17 years (Mean = 15.5, SD = 1.1) participated in this study, and 83% identified as black, 9% as white, and 7% as mixed ethnicities or Hispanic, which reflects the racial/ethnic makeup of the clinics. Most of the participants were sexually active before enrollment (76%) and 75% reported sexual intercourse within the past 2 months.

Medical records showed that 89% (66/74) of girls had received the first dose of HPV vaccine, 78% (58/74) the second dose, and 65% (48/74) all three doses. However, only 36 of the 66 adolescents who received vaccine reported getting vaccinated (sensitivity = .54) and only 50 mothers of the 66 vaccinated adolescents accurately reported that their daughters received HPV vaccine (sensitivity = .76). Moreover, of the 48 adolescents only 17 (35%) who received all three doses accurately reported completing the vaccine series, with 20 (42%) saying that they had received no vaccine at all. Their mothers were only slightly more accurate, with 25 of 48 (52%) correctly indicating that their daughter had received all three vaccine doses and 9 (19%) reporting that their daughter had received no vaccine. For those whose medical records indicated no vaccination, all eight mothers and daughters accurately reported no doses of vaccine (specificity = 1.0). Predictive values are reported in Table 1.

Of the adolescents who were vaccinated and did not receive their first dose on the day of the survey (n = 59), girls who were accurate in their self-reported vaccination status (≥1 dose) were not more likely to have been sexually active in the past 2 months (p = .75), or had more sexual partners in that timeframe (p = .81). Among the 66 daughters who had received any HPV vaccine, mothers who inaccurately reported no receipt of vaccine had lower HPV knowledge scores as compared with accurate reporters (F (1,65) = 5.21; p = .02). HPV knowledge scores were unrelated to the accuracy of reporting among the daughters. Age of the girls and times since first or last sex were not related to the accuracy of self-report.

Discussion

High levels of inaccuracy were found between actual HPV vaccination status and self-reported vaccine receipt. All the errors involved under-reporting of vaccination status. This finding has relevance for researchers who rely on self-report, and has limited implications for clinical practice, for example, in cases when vaccine status cannot be verified. Confirmation of self-reported vaccination status is important, and these data support the need for immunization registries.

Whether parents and adolescents accurately remember their HPV vaccination status may depend on several factors, including HPV vaccine-related attitudes of the population and healthcare provider communication about HPV. Certain populations may have families that pay less attention to specific vaccines, and therefore have lower accuracy in reporting vaccination status. Additionally, the sensitivity and specificity of a measure depend greatly on the population in which it is administered [8]. We found HPV vaccination rates to be higher than the estimated vaccination coverage for both Indiana (37.1%, ≥1 dose) and Marion County (52%, ≥1 dose) [9]. The high HPV vaccination rates in this population deflate the negative predictive value (NPV) because there are far less true negatives. The low NPV may also be a product of provider delivery of vaccines to adolescents (i.e., multiple vaccines administered at once) [10], in which case adolescents and their parents may not know exactly which vaccines they have received. We did not ask about other adolescent vaccines, but the results might have been similar for other simultaneously administered vaccines. It is noteworthy that our findings are limited by the relatively small sample size and that our sample was relatively homogeneous in terms of geography, ethnicity, and socioeconomic status.

These findings have some implications regarding concerns that HPV vaccination encourages adolescent sexual behavior. If a large percentage of adolescents cannot remember whether they have been vaccinated, it is unlikely that sexual behaviors will change as a result of vaccination. More research is needed to examine this effect, but these data suggest that HPV vaccination

is not a salient enough event for many adolescent girls to change their sexual behavior patterns.

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References

[1] Gindi M, Oravitz P, Sexton R, et al. Unreliability of reported tetanus vaccination histories. Am J Emerg Med 2005;23:120–2.
[2] Skull SA, Andrews RM, Byrnes GB, et al. Validity of self-reported influenza and pneumococcal vaccination status among a cohort of hospitalized elderly inpatients. Vaccine 2007;25:4775–83.
[3] Irving SA, Donahue JG, Shay DK, et al. Evaluation of self-reported and registry-based influenza vaccination status in a Wisconsin cohort. Vaccine 2009;27:6546–9.
[4] Kwong JC, Manuel DG. Using OHIP physician billing claims to ascertain individual influenza vaccination status. Vaccine 2007;25:1270–4.
[5] Hagen PT, Bond AR, Rehman H, et al. Have you had a tetanus booster in the last 10 years? Sensitivity and specificity of the question. Patient Educ Couns 2008;70:403–6.
[6] Shenson D, DiMartino D, Bolen J, et al. Validation of self-reported pneumococcal vaccination in behavioral risk factor surveillance surveys: Experience from the sickness prevention achieved through regional collaboration (SPARC) program. Vaccine 2005;23:1015–20.
[7] Kahn JA, Rosenthal SL, Jin Y, et al. Rates of human papillomavirus vaccination, attitudes about vaccination, and human papillomavirus prevalence in young women. Obstet Gynecol 2008;111:1103–10.
[8] Hlatky MA, Pryor DB, Harrell FE, et al. Factors affecting sensitivity and specificity of exercise electrocardiography: Multivariable analysis. Am J Med 1984;77:64–71.
[9] Centers for Disease Control and Prevention (CDC). National, state, and local area vaccination coverage among adolescents aged 13–17 years—United States, 2009. MMWR Morb Mortal Wkly Rep. 2010;59:1018–23.
[10] Dempsey AF, Cowan AE, Broder KR, et al. Vaccine use among primary care physicians. J Adolesc Health 2009;44:387–93.