Vaccine 37 (2019) 2998–3001

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Short communication

Low-income Hispanic parent recall of daughters' HPV vaccination status: Correlates of accurate reporting of daughters' HPV-vaccine naïve status compared with electronic health records

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ARTICLE INFO

Article history:
Received 27 August 2018
Received in revised form 12 April 2019
Accepted 22 April 2019
Available online 26 April 2019

Keywords:
HPV vaccination
Adolescents
Parental recall
Immunization registries
Hispanic

ABSTRACT

Purpose: This study aimed to (1) assess the accuracy of parental recall of adolescent (11–17 years) daughters' HPV vaccine initiation in a low-income, urban Hispanic population, and (2) describe the correlates of accurate recall.
Methods: We compared parental recall of HPV vaccine naivety to daughter's electronic medical records to calculate the proportion of parents accurately reporting HPV naïve status. We used mixed effects logistic regression to identify correlates of accurate recall.
Results: We verified vaccination status for 1103 daughters of participants who reported their daughters were HPV vaccine-naïve; 69.3% of parents accurately reported their daughters as HPV vaccine-naïve. Parents of older daughters (13–17 years) compared to younger daughters (11–12 years) had significantly lower odds of accurately reporting daughters as unvaccinated (AOR = 0.60; 95% CI 0.42–0.83).
Discussion: Underreporting of vaccination status among our study population corresponds with national data that suggest lower income and minority populations underreport HPV vaccination initiation and completion.

1. Introduction

Accurate information about child's vaccination history is important for clinical care, population-based immunization surveys, and vaccination research. However, vaccination status is often measured using parental recall, with or without parental access to immunization cards [1–4]. Previous studies have found parental recall may lead to incorrect vaccination estimates for diphtheria and tetanus toxoids and pertussis vaccine, oral polio vaccine, measles, mumps and rubella vaccine, and flu vaccine [5,6]. Emerging literature suggests that the problem persists when assessing daughters' HPV vaccination status, particularly among underserved and low socioeconomic populations [4,7]. Additionally, the need to recall multiple doses of a vaccine, such as the HPV vaccine, may increase inaccuracy of coverage estimates [7]. Previously identified correlates of inaccurate parental recall include nonwhite, low parental education, living below the poverty line, having public insurance, and low parental knowledge of HPV [2–5]. This study used electronic medical records and parental recall of HPV vaccination to (1) assess the accuracy of parental recall of adolescent (11–17 years) daughters' HPV vaccine initiation history in a low-income, urban Hispanic population, and (2) describe the correlates of parental HPV vaccination initiation recall.

2. Methods

We conducted a cross-sectional study of baseline data collected from *Por Nuestras Hijas* (*PNH*; *For Our Daughters*), a group randomized controlled trial assessing the effectiveness of two parent education interventions to increase HPV vaccination among low-income Hispanic adolescent females [8]. Data were collected November 2012 to January 2015. The University of Texas Health Science Center at Houston and Harris Health System Institutional Review Boards approved the study.

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https://doi.org/10.1016/j.vaccine.2019.04.064
0264-410X/

2.1. Participants and data collection

Bilingual data collectors recruited participants from 30 clinics participating in *PNH. PNH* participant eligibility criteria included: (1) having a daughter aged 11–17 years; (2) reporting daughter to be HPV vaccine-naïve; and (3) self-identifying as Hispanic/Latina/o. If parents reported having more than one daughter meeting eligibility criteria, we asked about the daughter with the most recent birthday. Clinics were county-affiliated and community clinics, including Federally Qualitied Health Centers, participating in Texas Vaccines for Children [9]. Data collectors obtained informed consent, obtained contact information for alternative locations of care, and administered a baseline survey. After baseline surveys, we extracted EMR data to validate parent-reported vaccination status via Epic, the EMR system utilized by some participating clinics. We submitted written requests for records at clinics without Epic. When unable to locate daughters' records within study clinics, we followed the same procedure to access data from alternative clinics provided by parents. We utilized clinic EMR records to verify vaccination status instead of the Texas immunization registry ImmTrac2 because the registry is an opt-in system and not all adolescents' records are captured in it.

2.2. Variables

Outcome variable. We defined parent report of daughter's HPV vaccine-naïve status as accurate if the EMR indicated she did not initiate the HPV vaccine series prior to the baseline survey. We labeled a parent report as inaccurate if the EMR indicated the daughter had initiated the HPV vaccine series prior to baseline (parent reported a false negative).

Independent variables. Demographic variables included daughter's age, insurance status, parent education, marital status, and employment status measured dichotomously, and parent age and household percent of the federal poverty line measured as continuous variables. To calculate percent of the federal poverty line (FPL), we used parent-reported annual household income, number of individuals in the household, and federal poverty guidelines for the year the participant completed the survey [10]. Because household income was a categorical variable, we used the median value in the applicable category in our calculations. We measured parental awareness of HPV, awareness of the HPV vaccine, and HPV knowledge with a series of yes/no and true/false questions (Table 1). We labeled parents with 0–1 knowledge questions correct as "low knowledge" and parents with 2–3 knowledge questions correct as "high knowledge."

Table 1
Screening questions and parental awareness and knowledge survey items.

Item	Response Options
Screening questions assessing daughter's vaccination status	
Do you have a daughter between the ages 11 and 17 years?	Yes/No
Has your daughter received the HPV vaccine?[1]	Yes/No
Parental Awareness of HPV	
Before today, had you ever heard of HPV?	Yes/No
Parental Awareness of the HPV vaccine	
Before today, had you ever heard of the HPV vaccine, HPV shot, or cervical cancer vaccine?	Yes/No
Parental knowledge of HPV	
HPV can cause cervical cancer.	True/False
HPV can be spread by sexual contact	True/False
A woman can usually tell if she has HPV	True/False

[1] Item preceded by the statement: HPV stands for human papillomavirus. It is a group of viruses. Some types of HPV may lead to infections and health problems.

2.3. Data analysis

We computed descriptive statistics for all variables and used mixed effects logistic regression to assess bivariate relations between independent and outcome variables. This allowed us to account for participant clustering within clinics. All variables with $p < 0.25$ in bivariate analyses were included in multivariable analyses. We conducted mixed effects logistic regression for multivariable analysis with an alpha cutoff of $p < 0.05$. All analyses were run using Stata v.15 [11].

3. Results

3.1. Accuracy of parental reporting

We verified HPV vaccination status for 1103 daughters of participants who reported their daughters were HPV vaccine-naive. Overall, 69.3% of parents accurately reported their daughters as HPV-vaccine naïve; 31.6% inaccurately reported daughters as naïve at baseline (Table 2), that is, EMR review indicated the daughter had received at least one HPV vaccination.

3.2. Participant characteristics

Mean parental age was 38.8 years. Most parents had less than a high school education (72%), were married or living with a partner (74%), and were unemployed or outside the labor force (68%). Most lived at <100% FPL with a mean of 60.7% FPL. Most were aware of HPV (61%) and the HPV vaccine (59%); half had low knowledge about HPV. Most daughters were between 13 and 17 years, and most had some type of insurance. Only 4% of the daughters had private insurance while 49% had Medicaid and 31% had other forms of public insurance.

3.3. Correlates of accurate parental reporting

Daughter's age, insurance status, parental education, marital status, employment status, awareness of HPV, and household percent FPL were statistically associated with accurate parental reporting at $p < 0.25$ in bivariate analysis (Table 2). In multivariable analysis, only daughter's age was significantly associated with accurate parental reporting. Parents of older daughters (13–17 years) compared to younger daughters (11–12 years) had significantly lower odds of accurately reporting daughters as unvaccinated (AOR = 0.60; 95% CI 0.42–0.83).

4. Discussion

We found that nearly one-third of parents inaccurately reported their daughter's vaccine status as HPV-vaccine naïve. Underreporting of vaccination status among our mostly publicly insured Hispanic study population corresponds with national data that suggest lower income and minority populations may underreport HPV vaccination initiation and completion [3,4]. Parents of older adolescents had lower odds of accurately reporting daughters' vaccination statuses compared to parents of younger adolescents. The HPV vaccine is recommended for adolescents aged 11–12 years and often administered alongside other adolescent vaccines during well-child visits [12]. Parents with older daughters may be farther away from their daughters' well-child visit dates and therefore less likely to remember if they did or did not receive the HPV vaccine. Older adolescents also have more opportunities to receive the vaccine due to additional visits after the 11–12 year old visit, and parents may not remember whether or not vaccination was part of the 11–12 year old vaccine bundle.

Table 2
Correlates of accurate parental recall of daughters unvaccinated status (N = 1103).

	Unadjusted Analysis					Adjusted Analysis		
Variable	**Inaccurate n (%)**	**Accurate n (%)**	**OR**	**95% CI**	***p*-value**	**AOR**	**95% CI**	***p*-value**
Accurate parental recall	338 (30.6)	765 (69.3)						
Daughter age								
11-12 years	130 (27.0)	352 (73.0)	REF			REF		
13-17 years	208 (33.5)	413 (66.6)	0.70	0.53-0.92	0.01	0.60	0.42-0.83	**<0.01**
Daughter insurance status								
Uninsured	38 (21.8)	136 (78.2)	1.65	1.08-2.51	0.02	1.55	0.91-2.63	0.11
Insured[a]	295 (32.5)	614 (67.6)	REF			REF		
Parent age, M(SD)	38.8 (7.04)	38.8 (6.64)	1.00	0.97-1.02	0.94			
Parent education								
None – 11th grade	259 (32.8)	530 (67.2)	0.62	0.45-0.86	<0.01	0.79	0.53-1.19	0.27
12th grade or higher	74 (24.4)	229 (75.6)	REF			REF		
Parent marital status								
Unmarried	100 (34.8)	187 (65.2)	0.82	0.61-1.11	0.21	0.81	0.53-1.24	0.33
Married/living with partner	233 (28.9)	573 (71.1)	REF			REF		
Parent employment status								
Unemployed/out of labor force[b]	236 (31.8)	507 (68.2)	0.79	0.59-1.06	0.11	0.78	0.52-1.18	0.24
Employed	98 (27.9)	253 (72.1)	REF			REF		
Household percent federal poverty line, M(SD)	55.4 (38.5)	62.8 (39.3)	1.01	1.00-1.01	0.04	1.00	1.00-1.01	0.10
Parent Aware of HPV								
No	144 (34.3)	276 (65.7)	0.77	0.58-1.02	0.07	0.75	0.53-1.08	0.12
Yes	182 (28.0)	468 (72.0)	REF					
Parent HPV knowledge								
Low	171 (30.8)	384 (69.2)	REF					
High	167 (30.5)	381 (69.5)	1.04	0.79-1.37	0.77			
Parent aware of HPV vaccine								
No	150 (33.3)	301 (66.7)	0.86	0.65-1.13	0.29			
Yes	184 (28.9)	452 (71.1)	REF					

[a] Due to small private insurance cell size, we combined public and private insurance.
[b] Out of the labor force included homemaker, student, retired, or unable to work.

This study has some limitations. Findings cannot be generalized to Hispanic adolescents as a whole because *PNH* targeted low-income parents of Hispanic adolescent females. Thus our data were limited to the vaccination status of Hispanic females. Additional research is needed to identify correlates of accurate parental recall among parents of adolescent males. Further, due to *PNH* eligibility criteria, we only captured parents who reported their daughters were unvaccinated at baseline. Parents reporting that their daughters were vaccinated were ineligible to participate in *PNH*, and we did not check medical records to confirm vaccination status. Correlates may differ for those accurately reporting daughters as having received one or more HPV vaccine doses. Because we did not assess accuracy among parents with vaccinated daughters, we were unable to assess specificity, sensitivity, positive predictive value, and negative predictive value of parental reports. Next, data collection took place in participating clinic waiting rooms. Although data collectors took precautions to ensure privacy during eligibility assessments, it is possible some parents overheard the eligibility criteria and reported their daughters as unvaccinated in order to be a part of the *PNH* study. Finally, if adolescents were vaccinated at clinics other than those that were contacted, there is the possibility for incomplete data affecting our outcome.

Despite limitations, this work provides important insight for providers and researchers who rely on parental reports of child's vaccination status, particularly among low-income families. Specifically, families without insurance are less likely to report having a usual source of care [13], which limits the effectiveness of clinic-specific centralized vaccination records systems. Inaccuracy of parent-reported vaccine status also highlights the importance of improving larger immunization information systems, or registries, to ascertain vaccination status. Immunization information systems are a recommended strategy for managing childhood and adolescent vaccine records [14,15]. Clinician access to statewide immunization registries, for example, can improve vaccine coverage by ensuring adolescents receive needed doses, regardless of which clinic the child attends and without relying on parental recall and the possibility of false negatives.

Poor vaccination recall among low-income parents in Texas underscores the need for a state-wide approach to managing childhood vaccination. The Texas Immunization Registry ImmTrac2 is an opt-in system where parents must give consent for vaccination records to be added; therefore, it does not capture all records in the state. Clinicians must still rely on parental reporting which can be inaccurate. Changing ImmTrac2 to opt-out has two primary benefits including increased vaccination coverage and cost savings. Opt-out registries are associated with increased statewide vaccine coverage compared to states with opt-in registries such as ImmTrac2 [16]. Additionally, Bloom et al. found that changing ImmTrac2 to opt-out may be more cost-effective than current opt-in consent processes allowing limited resources to be allocated elsewhere [17]. Ultimately, changing ImmTrac2 to an opt-out system can be an effective and cost-effective strategy to increase HPV vaccine coverage in Texas by facilitating management of vaccination records [14,15].

Conflicts of interests

Authors declare no conflicts of interest.

Acknowledgements

This work was supported by the Cancer Prevention and Research Institute of Texas (CPRIT) grant RP130459 and RP100865. SAR was supported by a predoctoral fellowship from the University of Texas School of Public Health Cancer Education and Career Development Program – National Cancer Institute/ National Institutes of Health Grant R25 CA57712. SAR received

partial support from the University of Texas Health Science Center at Houston, School of Public Health Department of Health Promotion and Behavioral Sciences. The content is solely the responsibility of the authors and does not necessarily represent the official views of CPRIT, the National Cancer Institute, or the National Institutes of Health. The authors thank Natalie Fernandez-Espada, Diana Lopez, Angelia Roncancio, Sharon Coan, Milet Serna, and Jennifer Villamar for their support in data collection, database maintenance, and project coordination.

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