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Awareness of and Support for HPV Vaccination Among Pacific Islander Women in Southern California

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Abstract

Pacific Islander (PI) women experience disproportionately high rates of cervical cancer and mortality and have lower rates of Pap testing. Since up to 70% of cervical cancers could be prevented by being vaccinated for human papilloma virus (HPV), this cross-sectional study explored the predictors of HPV and vaccine awareness, receipt of the vaccine, and attitudes toward vaccinating children among adult PI women in southern California, who historically have low rates of HPV vaccination and high rates of cervical cancer that could be prevented with HPV vaccination. Participants ($n=148$) consist a subsample of Chamorro, Samoan, and Tongan women, ages 21 to 65 years, who were in a larger randomized community study to promote Pap testing. Overall, younger age and higher American acculturation were significantly associated with ever hearing about HPV and the vaccine. However, American acculturation was also associated with negative attitudes toward vaccinating their children for HPV. This paper provides preliminary insights into barriers and facilitators to HPV vaccination among PIs in the USA and also informs the development of educational programs to reduce cervical cancer incidence and mortality in this underserved population.

Keywords Human papillomavirus · Vaccination · Acculturation · Pacific Islander · Women

Introduction

US women of Pacific Islander (PI) descent have higher rates of cervical cancer compared with non-Hispanic whites (NHWs). The age-adjusted incidence rate of cervical cancer among Samoan women (15.1 per 100,000) and native Hawaiians (12.3 per 100,000) are substantially higher compared with NHW women (8.1 per 100,000) [1]. PIs in the US are a rapidly growing population: in 2010, with over 1.2 million and a growth rate of 40% since 2000 [2]. PIs in the USA also face enormous barriers to care compared with NHWs, with 17% living without health insurance, 15% not seeing a doctor when needed because of cost, and limited English proficiency among many Tongan and Samoan Americans, with very few healthcare providers who speak their native language [2].

Up to 70% of cervical cancers could be prevented by being vaccinated for HPV. From 2007 to 2010, HPV vaccination has led to a 56% decrease in vaccine-targeted HPV prevalence among girls aged 14–19 years [3]. In a nationwide study, completion of the HPV vaccination series among adolescents was related to parents receiving a provider recommendation [4]. Furthermore, HPV vaccination among older “catch-up” women (age 16–26 years old) has been efficacious across 4 randomized clinical trials [5]. Unfortunately, HPV vaccine data by race were not available for PIs in either study.

PI women have even more to gain from HPV vaccination, as up to 88% of PI women with cervical cancer have vaccineable HPV subtypes [6]. Despite this, the limited existing research suggests that PI women in the USA are less aware about HPV and the vaccine. In nationwide surveillance data, PI women were over 2.5 times more likely than NHWs to have not heard about HPV and nearly 3 times more likely to have not heard about the HPV vaccine [7]. A qualitative study of Chamorro and Tongan women in southern California found that participants’ awareness of HPV and its vaccine was limited to the “One Less” advertisement campaign for the GARDASIL vaccine [8]. Another study found that PI parents and caregivers of 11–17-year-olds had low levels of awareness of both HPV and its vaccine [9]. In addition, the parents and caregivers had low knowledge of facts about HPV (e.g.,

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that it is most often asymptomatic) and its vaccine (e.g., that the HPV vaccine requires more than one dose). Hence, awareness and factual knowledge about HPV and its vaccine are considered important targets for HPV uptake interventions in the PI population [9].

Acculturation to the USA may also be an important background characteristic to consider in HPV-related research among PIs. In a qualitative study, Chamorros and Tongans indicated that US acculturation brings an increased awareness of sexual health and an openness to discuss sexual health-related topics between PI parents and children [8]. Hence, acculturation to the US and the PI culture were analyzed in this study.

The dearth of research about HPV awareness and vaccine acceptance among PIs severely limits educational planning for these communities. We used a cross-sectional subsample of 148 PI women aged 21–65 years, who were part of larger community-based participatory research approach (CBPR) Pap test intervention in southern California. We conducted analyses to explore the relationship between HPV-related variables and (1) demographic characteristics; (2) acculturation to the US and PI culture, (3) knowledge of cervical cancer risk factors, and (4) fatalistic attitudes toward cervical cancer. Although the main focus of the larger study was cervical cancer screening, HPV vaccination was also of high interest to the participating PI study partners. Therefore, the intent of this paper is to inform the development of culturally tailored community interventions concerning HPV vaccination.

Methods

Overview

Data were drawn from a longitudinal community randomized social support study to increase Pap testing among Chamorro, Samoan, and Tongan women in southern California. The study was led by a CBPR partnership involving 1 academic institution, 4 PI-serving community-based organizations, and a Community Advisory Board (CAB) that guided all aspects of the study including the original research questions, designing and translating all instruments, and engaging community members as partners and participants [10]. Participants were members of PI faith-based organizations or social clans, 21–65 years of age, and in a long-term partnership or marriage for at least 5 years (since the intervention targeted women and their husbands/partners). A total of 585 women met inclusion criteria and completed the pre-test survey, of which 412 of them (70.4%) completed the 6-month follow-up survey. Of the 412 follow-up surveys, 264 of them were completed by paper and pencil (64.1%) and 148 were completed online (35.9%). During follow-up survey administration, the loss of a significant community member to cervical cancer (the sister

of one of the CAB members) heightened the community's interest in primary prevention. This led to the development of HPV-related questions that were added to the follow-up survey, specifically the online format that was most quickly and easily modified to include these HPV questions. The analytic sample consisted of $n=148$ PI women who completed the online follow-up survey.

Written informed consent was obtained for every individual at the beginning of the community randomized trial. The analytic sample for this study provided their informed consent and completed their third and final survey online. All study procedures, including organizational and individual recruitment protocols and individual signed consent forms, were approved by the PI's university IRB.

Data collection

Organizational sampling was utilized to recruit Samoan and Tongan churches and Chamorro clans in southern California, which were known to the investigators based upon previous partnerships with the PI community. The recruitment process involved multiple follow-up calls, in-person meetings, and attendance at social events. Church/clan leader(s) agreed to have their organization participate in the study and recruited eligible congregation/family members to participate. Study staff scheduled sessions at each site to deliver the self-administered pre-test survey, the intervention or standard of care intervention, and the 6-month follow-up survey. Surveys were available in English, Samoan, and Tongan languages; the CBPR partnership decided that Chamorro participants would be comfortable participating in English-only. All participants received \$10 for completing the pre-test survey and \$15 for completing the 6-month follow-up survey, either in person (by paper and pencil) or online. See a previous publication for more details on the data collection measures [10].

Measures

Demographic variables were measured at pre-test and included participants' age, PI ethnicity, health insurance coverage, employment status, and treatment group assignment (intervention vs. control) in the larger randomized study. For hypothesis testing, we decided to recode age, based upon women's potential eligibility to be vaccinated, based on age. The current recommendation is that unvaccinated men and women through ages of 26 years should receive catch-up vaccination to prevent infection and HPV-related disease [11]. Furthermore, the Centers for Disease Control and Prevention (CDC) recommends that individuals aged 27–45 years should discuss HPV vaccination through shared clinical decision-making [12]. For our study, participants reported their age on the survey with the following options: 21–30, 31–40, 41–50, and 50+ years. To best distinguish participants who were

potentially age-eligible for HPV vaccination, from those who were not, we recoded age to a dichotomous variable: (1) age 40+ years and (2) under age 40. Given the limitations of our age survey item, we could not decipher those between ages 41–45 years, who were potentially eligible for HPV vaccination. Acculturation items were adapted from the Kohala Health Research Project [13] and included 10 items for which possible scores ranged from 5–15 and assessed their levels of US and PI acculturation. Knowledge of cervical cancer risk was assessed with 11 true/false statements about sexual history, human papillomavirus infection, oral contraceptives, and family history [14]. Lastly, participants completed five true/false items regarding fatalistic attitudes toward cervical cancer [15].

Outcome variables were measured at follow-up and included HPV awareness, having received the vaccine, and attitudes toward vaccinating a child. Such questions included the following: “ever heard of HPV,” “heard of the HPV vaccine to prevent cervical cancer,” “ever received the HPV vaccine,” and “if you have a son or daughter age 9 to 26, would you be interested in getting him/her a HPV vaccine.” Participants were told that they could answer the last question even if they did not have a child of vaccineable age at the time, and thus, the entire analytic sample, which was relatively small, was eligible to answer the intention question. Questions came from the 2001 California Health Interview Survey [16]. The answers to all the questions were “yes,” “no,” and “I do not know.” In this study, the latter two answers were collapsed into one category, as a “yes” response was the desired outcome.

Translation

The survey was translated from English to the native PI language by a bilingual and bicultural translator. The surveys were then independently reviewed by a second translator for clarity, simplicity, utilization of conceptual words/phrases rather than the literal translation, and use of culturally appropriate words/phrases. Any discrepancies between the translators were discussed and resulted in a final approval from Community Advisory Board members. The surveys were pilot tested by 9 community members, 3 from each of the 3 ethnic groups, who met all of the eligibility requirements but did not participate in the study.

Analyses

First, bivariate analyses were run to determine whether our analytic sample of online participants ($n=148$) differed on demographic characteristics and predictor variables from the participants who completed the follow-up paper-and-pencil survey ($n=264$). Next, descriptive statistics were calculated for all study variables. Bivariate logistic regression models were run to determine whether any of the predictor variables

were associated with the HPV outcomes. Only those predictors that were significantly associated with a given outcome were entered into the multivariate model of that outcome. This strategy was chosen because Hosmer and Lemeshow suggest that the entry of all possible predictors into one multivariate logistic regression model, regardless of their significance, can lead to statistically unstable estimates [17].

The criterion for statistical significance for the odds ratios in the bivariate analyses was set at $p \leq .10$. This less stringent criterion was chosen because the traditional significance level of .05 can often lead to the exclusion of variables that have important relationships with the outcome being measured [18]. The only exception to the $p \leq .10$ criterion was the intervention vs. control group variable, which was included in all

Table 1 Descriptive characteristics and HPV-related outcomes

Predictor variables ^a	<i>n</i>	%
Age ^a		
21–29	37	26.8
30–39	30	21.7
40–49	41	29.7
≥ 50	30	21.7
Treatment group ^a		
Intervention	39	26.4
Control	100	67.6
Ethnicity ^a		
Chamorro	49	36.3
Tongan	54	40.0
Samoan	32	23.7
Health insurance ^a		
No	40	29.0
Yes	98	71.0
Employment ^a		
No	54	38.8
Yes	82	59.0
Retired	3	2.2
	<i>M</i>	<i>SD</i>
PI acculturation (range 5–15)	13.2	2.0
AM acculturation (range 5–15)	12.1	2.3
Fatalistic attitudes toward cancer (range 0–5)	0.9	1.3
Knowledge of cervical cancer risk factors (range 0–11)	6.2	2.5
Dependent variables ^b	<i>n</i>	%
Heard of HPV	95	64.2
Heard of HPV vaccine	88	59.5
Received HPV vaccine ^c	32	30.3
Would vaccinate child	70	46.6

^a Measured at pretest

^b Measured at 6-month follow-up

^c Percentage calculated only for women under age 40 years, since older women would not have been eligible for the vaccine

multivariate analyses. This was done because the intervention group but not the standard of care group was exposed to some information about HPV infection in the PowerPoint presentation they viewed. The criterion for statistical significance for the adjusted odds ratios in the multivariate analyses was set at $p \leq 0.05$.

Results

As shown in Table 1, nearly half of our subsample participants were between the ages of 21–39 years; 36.3% of participants were Chamorro, 40% were Tongan, and 23.7% were Samoan; the majority had health insurance (71%) and were employed (59%). The PI and US acculturation means were 13.2 (SD=2.0) and 12.1 (SD=2.3), respectively. Out of 5 points possible, the average fatalism score was very low ($M=1.0$, $SD=1.3$). Out of 11 points possible, the average cervical cancer risk knowledge score was 6.2 (SD=2.5). Lastly, the majority had heard of HPV (64.2%) and the HPV vaccine (59.2%). However only 30.3% of women under age 40 had received the vaccine; and 46.6% of the entire sample indicated they would allow their age-eligible child to be vaccinated.

Significant bivariate odds ratios and multivariate adjusted odds ratios (AORs) are shown in Table 2. Bivariate analyses indicated that younger age (less than 40 years) and American acculturation were associated with 3 outcome variables of interest: hearing about HPV, hearing about the HPV vaccine,

and a positive attitude toward vaccinating their child. Higher scores on fatalism were negatively associated with having heard about HPV and the HPV vaccine. Samoans were less likely to have ever heard about HPV compared with non-Samoans, while employed participants were more likely to have heard about the HPV vaccine compared with other participants; Tongans were less likely to hear about the HPV vaccine compared with non-Tongans.

AORs indicated that American acculturation was associated with an increased likelihood of hearing about HPV ($p=0.02$), but less intention to vaccinate their own children ($p=0.03$). Tongans were less likely to hear about the vaccine compared with non-Tongans ($p=0.02$). Women over the age of 40 years were less willing to have their child vaccinated ($p=0.01$) compared with women under age 40. No significant relationships were found for any variables with receipt of the HPV vaccine; hence, these results are not shown.

Discussion

HPV vaccination remains one of the most important strategies for cancer prevention, particularly in populations with high rates of cervical cancer such as PIs. This exploratory study found selected factors associated with HPV and vaccine awareness, as well as positive attitudes toward vaccinating a child. Similar to at least one previous study, albeit among Vietnamese women [19], higher American acculturation were

Table 2 Predictors of HPV-related outcomes

HPV-related outcomes predictors	OR	95% CI	<i>p</i>	AOR	95% CI	<i>p</i>
Heard of HPV						
Age (40+ years)	0.54	0.26–1.11	0.09	0.73	0.32–1.65	0.45
Samoan	2.87	1.09–7.57	0.03	2.86	0.98–8.37	0.06
Am Acculturation	1.31	1.10–1.56	0.002	1.26	1.05–1.52	0.02
Fatalism	0.77	0.59–0.99	0.05	0.85	0.63–1.15	0.29
Heard of HPV vaccine						
Age (40+ years)	0.53	0.26–1.07	0.08	0.59	0.26–1.35	0.21
Employed	3.25	1.58–6.66	0.001	2.89	1.27–6.55	0.01
Tongan	0.27	0.13–0.56	0.00	0.33	0.13–0.83	0.02
Am acculturation	1.21	1.03–1.42	0.02	1.14	0.95–1.37	0.16
Fatalism	0.74	0.57–0.96	0.03	0.97	0.69–1.35	0.84
Would vaccinate child						
Age (40+ years)	0.44	0.21–0.91	0.03	0.37	0.17–0.82	0.01
Am Acculturation	0.86	0.73–1.01	0.06	0.82	0.69–0.98	0.03

Italicized *p*-values represent statistical significance for the AORs ($p \leq 0.05$)

Potential predictor variables in the models presented here were intervention vs. control group, age (40 years and older vs. under age 40), ethnicity (Samoans vs. non-Samoans, Tongans vs. non-Tongans, and Chamorros vs. non-Chamorros), health insurance status, employment status (employed vs. not employed or retired), and scores on PI acculturation, American acculturation, fatalistic attitudes toward cancer, and knowledge about cervical cancer risk factors. Only those predictors that were significantly associated with the given outcome variable in bivariate analyses are included here

associated with our HPV outcome variables, specifically having heard about HPV but less willingness to vaccinate their child for the virus. The findings suggest that younger PI women, who are acculturated to the USA, should be strongly considered for education designed to increase vaccination among their children. These findings also suggest the possible influence of anti-vaccination attitudes that are increasingly prevalent across California [20]. Further research is needed to identify strategies to reduce barriers to vaccination among children of US-acculturated PI parents.

Although women aged < 40 years in our study were more willing to have their child vaccinated compared with women aged $\geq$ 40 years, only 30.3% of them reported receiving the HPV vaccine. Given the higher cervical cancer mortality among PIs compared with NHWs [1], it is particularly important for educational programs to include catch-up vaccination messages, as well as set up appointments to complete the vaccination series whenever possible.

The lack of significant associations between HPV-related outcomes and known cognitive factors (e.g., knowledge of cervical cancer risk, fatalism toward cervical cancer) duplicates findings from other non-PI studies [21], and suggests that other variables (e.g., social support and normative attitudes) may be more influential to promoting childhood vaccination in PI and other collectivistic communities.

Limitations

While this paper contributes to the literature on HPV vaccination in cancer disparity populations, it was limited by design issues. First, the analytic sample was derived from women who opted to complete the online survey version, biasing our sample toward those who were younger, had lower health insurance coverage, and more fatalistic views about cervical cancer compared to those in the larger randomized trial of this study. Second, HPV vaccination status was self-reported and not verified with medical records and hence may not reflect actual vaccination status [22].

Conclusion

This study provides potential insights into possible approaches to increase childhood and catch-up vaccination rates among US PIs. A review of factors associated with HPV vaccine hesitancy in the western Pacific region found similarly low levels of knowledge and suggested that interventions address concerns regarding HPV vaccine cost and safety, as well as promote cancer prevention benefits, to increase uptake [23]. Our study suggests that larger assessments of HPV vaccine knowledge, attitudes, access, and acceptability among PIs, particularly ethnic-specific PI populations, may provide further evidence to inform HPV vaccination campaigns. Lastly,

given the growing literature regarding the importance of primary care provider recommendations on vaccine coverage in youth, we urge researchers to include PIs in their studies of patient-provider communication and interventions.

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Availability of data and material In accordance with NIH recommendations, de-identified data for this study can be made available upon request.

Code availability All analyses were conducted using SPSS, version 25. No custom codes were used to conduct the analyses.

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Declarations

Ethics approval and consent to participate The study presented in this manuscript was approved by the Institutional Review Board at California State University, Fullerton prior to implementation. At the time of recruitment, the research team explained to the participants, in person, the purpose of the study. Participants also received an informed consent form document, which they had time to review. Participants then provided their written consent on the last page of the informed consent form prior to answering survey questions.

Consent for publication The consent form that participants sign indicates that the results from this study could be used for research purposes in the future, including peer-reviewed conference presentations and publications.

Conflict of interest The authors declare that they have no conflict of interest.

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