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Parental education and text messaging reminders as effective community based tools to increase HPV vaccination rates among Mexican American children

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ABSTRACT

Objective. Latino populations, particularly Mexican-Americans who comprise 65% of the Latinos in the U.S., are disproportionately affected by HPV-related diseases. The HPV vaccination completion rates remain low, well below the Healthy People 2020 goal. In this study we assessed the effect of parental education and a text messaging reminder service on HPV vaccine completion rates among eligible children of Mexican American parents.

Study design. Nonequivalent group study of Mexican parents of HPV vaccine eligible children attended the Health Window program at the Mexican Consulate in New York City, a non-clinical, trusted community setting, during 2012–2013. 69 parents received HPV education onsite, 45 of whom also received a series of text message vaccination reminders. We measured HPV vaccination completion of the youngest eligible children of Mexican parents as the main outcome.

Results. 98% of those in the education plus text messaging group reported getting the first dose of the vaccine for their child and 87% among those in the educational group only ($p = 0.11$). 88% of those receiving the 1st dose in the text messaging group reported completing the three doses versus 40% in the educational group only ($p = 0.004$).

Conclusions. Parental text messaging plus education, implemented in a community based setting, was strongly associated with vaccine completion rates among vaccine-eligible Mexican American children. Although pilot in nature, the study achieved an 88% series completion rate in the children of those who received the text messages, significantly higher than current vaccination levels.

Introduction

Every year approximately 35,000 cases of Human Papilloma Virus (HPV) associated cancers occur in the U.S., with greater incidence among ethnic and racial minority populations (Jemal et al., 2013; Human papillomavirus-associated cancers-United States, 2002–2008, 2012). Latino populations, particularly Mexican-Americans, who comprise 65% of the Latinos in the U.S. (33.5 million) (Pew Research Hispanic Center, 2013), are disproportionally affected by HPV infection and HPV-related diseases (Human papillomavirus-associated cancers — United States, 2002–2008, 2012; Agency for Healthcare Research and Quality, 2011; Kahn et al., 2007; Kepka et al., 2010). The HPV vaccine has the potential to prevent the large majority of HPV associated cancer cases (Koutsky et al., 2002). The vaccine is currently approved for males and females 9–26 years of age (U.S. Food and Drug Administration, 2009), with the greatest benefits presumably achieved when administered at an early age, prior to the start of sexual activity.

Despite the significant advantages of preventing HPV infection, uptake of the vaccine has been suboptimal. According to the 2012 National Immunization Survey-Teen (NIS-Teen), the initiation rate for HPV vaccine series (first dose) was 54% for females, with only 33% completing three doses (among all adolescents) (Center for Disease Control P, 2013). The rate for Latina girls was slightly higher for first dose uptake (56%) compared to non-Hispanic Whites (51%), but lower for completion of the three doses (29% vs. 36%) (Jemal et al., 2013). Moreover, HPV vaccination among males is even lower. Among Latino boys 13–17 years of age, only 14.8% received the first dose, while only 2.7% completed the three doses in 2011 (Centers or Disease Control and Prevention, 2012). These rates are well below the Healthy People 2020 objective of an 80% completion rate (U.S. Department of Health and Human Services, 2013).

The most universal HPV vaccine barriers cited by Latino parents are lack of awareness about HPV and the HPV vaccine, and lack of provider

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recommendation for the vaccine (Guerry et al., 2011; Podolsky et al., 2009; Yeganeh et al., 2010). In addition, approximately 80% of Latino children in the U.S. had health insurance in 2010 and almost 87% reported having a regular source of medical care potentially reducing the barrier to access care. Furthermore, the HPV vaccine for children can be obtained through the Vaccines for Children Program at no cost. (Centers for Disease Control and Prevention: Vaccines for Children Program (VFC), 2013) Other parental barriers to obtain the vaccine for their children have been described in the literature, including parental distrust of the vaccine and issues related to promiscuity although less prominent than those described above (Lechuga et al., 2014).

Latino children are the fastest growing child population in the U.S., numbering 23.6 million in 2010 (Pew Research Hispanic Center, 2011; Fry and Passel, 2009). Over 300,000 Mexicans live in New York City and almost half are under the age of 18 years (United States Census Bureau, 2013). In 2007, the Consulate General of Mexico in New York established a "Health Window" program to serve Mexicans attending the Consulate. The "Health Window," or "Ventanilla de Salud" in Spanish, is a bi-national collaborative program. Academic and government institutions work to increase access to health care, raise awareness around health related issues, provide health screenings, and promote healthy lifestyle choices among low-income and migrant Latino communities in the United States. The unique structure of this model is the physical presence of the program on consular premises, which is designed to provide a diversity of services and resources in a culturally and linguistically sensitive manner, in a trusted environment, with trusted health personnel.

The Community Preventive Services Task Force (CSPTF) recommends "increasing community demand," defined as "efforts to provide or disseminate information, advice, or both to clients to increase and improve their efforts to seek appropriate vaccination" (Community Preventive Services Task Force) to increase vaccination rates. The HPV vaccine presents a particularly difficult additional barrier because three doses are required to accomplish full immunization compared to one dose for most other vaccines for older children and adults (i.e. flu vaccine). These additional 2 steps (second and third doses) have undermined vaccination completion, reducing vaccination rates.

Kharbanda et al. investigated the use of text messaging as a reminder to complete the three doses of the HPV vaccine and found an increase of 15% of on-time receipt of the next HPV vaccine dose among parents receiving a text message reminder for their child's vaccination, though all participants included in that study had already initiated the vaccine series (Kharbanda et al., 2011). Text messaging is widely used among the general population in the U.S., including Latinos. According to the Pew Research Center, over 85% of Americans own a cell phone and almost 75% send and/or receive text messages; these rates are similar for Hispanics and non-Hispanics (Pew Research Center, 2012).

In this pilot study, we assessed an intervention set in a non-clinical, trusted community setting serving large Mexican American populations, designed to increase HPV vaccine completion rates. The intervention contained a culturally-tailored HPV education intervention for Mexican parents of vaccine eligible children, followed, for a subset of parents by text-messaging vaccination reminders. Vaccine series completion rates were compared for the children of the two groups.

Methods

We conducted an exploratory study using a nonequivalent group design of Mexican parents of HPV vaccine eligible children, attending the Health Window Program at the Mexican Consulate in New York City, to assess the effect of parental HPV vaccine education with and without text messaging reminders on vaccination completion (3 doses) rates. This study was conducted under approval from the institutional review board at Memorial Sloan-Kettering Cancer Center.

Setting

The Health Window program at the Mexican Consulate in New York City is open weekdays and offers services described above to all those attending the Consulate. The Health Window does not administer the HPV vaccine or offers direct health care. The General Consulate of Mexico in New York serves an average of 400 visitors every day and an average of 90,000 people a year from the New York Metropolitan area.

Study population

Between December 2012 and May 2013 all those who attended the Health Window at the Consulate General of Mexico in New York City were approached consecutively to assess their eligibility to the study using a standardized intake form and to obtain consent to participate. This population was a self-selected group that decided to attend the Health Windows at the consulate for other than HPV vaccine information purposes. The following were used as inclusion criteria: An 18 years or older parent that: 1) was born in Mexico, or born in the U.S. but self-describes as Mexican American, 2) Spanish is his or her primary language, 3) has at minimum one child between the ages of 9 through 17 years who has not received the HPV vaccine, 4) self-identifies as the child's main caregiver, 5) currently owns a cell phone and uses text messaging services. Parents that had multiple HPV vaccine eligible children but one or more had already received the vaccine (any number of doses) were excluded from the study. It is important to note that to the best of our knowledge, there were no changes to the HPV guidelines, policies or payment during the course of the study in the New York City metropolitan area.

Intervention

Parental education. Trained lay health workers at the Health Window provided a one on one educational session to all study participants. The session included information on HPV, the HPV vaccine, and HPV-related cancers, and answered any questions the parent might have. A publicly available brochure obtained at the Centers for Disease Control and Prevention website about HPV vaccine was given to the parents (available at: http://www.cdc.gov/std/hpv/common/), and assistance linking their child with health care services was offered if needed. Parents were encouraged at the end of the session, to make an appointment with their child's provider or go to an immunization clinic to receive the vaccine. On average the educational session lasted 20 min.

Text messaging. After 24 consecutive participants were recruited to the non text messaging arm of the study, the following 45 participants were assigned to receive messages once a week reminding them of their child's vaccination eligibility, starting approximately one week after participating in the educational session. These reminders occurred until uptake of the first dose of the vaccine was reported, or for 6 weeks after recruitment. The message sent included the following: "*As a reminder, your child is eligible for the HPV vaccine, don't wait, protect your child!*". If a participant reported administering the first vaccine dose to his/her child (assessed by telephone), text messages resumed weekly starting one month prior to the second dose due date or until the second dose was reported or for a maximum of 8 weeks. The message sent during this stage was "*As a reminder, your child is eligible for the second dose of the HPV vaccine.*" and "*Don't forget, your child is not fully protected until he or she gets the three doses.*". Finally, a third batch of weekly text message reminders started 1 month prior to the due date of the third dose, depending on the time of second dose and only if a second dose was reported, and continued for 8 weeks or until the third dose was reported. The message sent at this stage was "*As a reminder, your child is eligible for the third and final dose of the HPV*

vaccine." and "*Don't forget, your child is not fully protected until he or she gets the three doses.*". All messages were sent in Spanish.

Primary outcome and outcome evaluation

The primary outcome assessed was HPV vaccine series completion (3 doses) for a parent's youngest eligible child (if more than one child was eligible), self reported by the parent. Although outcomes among siblings would be expected to correlate, we measured the youngest child's vaccine status for two reasons: 1) the youngest child's vaccine administration would most likely reflect parental decision-making compared to an older sibling, and 2) the youngest child may benefit the most from this preventive measure.

All outcome data were collected by telephone. The first outcome evaluation call occurred 2 weeks after the educational session, when participants were asked if and when their child obtained the vaccine. If no vaccination was reported, additional outcomes assessment calls were made at 4 and 6 weeks after the educational session. If the dose was still not received by then, the participant was considered a 'no effect' and no further follow-up was conducted. Calls were made only to assess outcome; health counseling was not provided at these calls. All participants who reported providing the first dose of the HPV vaccine to their youngest eligible child were followed by phone to assess completion of the second dose approximately 2 months after the first dose, and, if a second dose was reported, approximately 6 months after initial dose to assess third dose completion.

Statistical analysis

Descriptive statistics were used on all study variables to assess the distributions of the data and to compare the two independent groups. Outcome analysis was performed utilizing the between group design, where the independent variable was the group assignment (educational session alone, vs. educational session plus text messaging reminders) and the outcome (vaccination completion). We used chi-square or Fisher's exact test for this analysis. In addition, logistic regression was used to assess likelihood of vaccination completion when controlling for participant's socio-demographic and other variables.

Results

Sixty-nine participants were recruited to the study. The first 24 received the educational session alone and the following 45 received the educational session followed by the text messaging reminder system. Initially the study was designed to recruit 25 parents in each arm, but the text messaging arm was extended to 45 subjects during recruitment. There was an unexpectedly high interest in information about the HPV vaccine and in participating in the study in this population throughout the implementation of the study. In addition, there was a high rate of participants meeting the inclusion criteria and the study didn't have available resources to extend enrollment further.

One participant in the education session only group was lost to follow-up, and two were lost in the educational session plus text messaging group. These three participants did not answer any of the calls from the study team; all other participants were successfully reached by phone to assess outcomes. All participants were born in Mexico, all reported Spanish as their primary language, 99% reported having a primary source of care for their child at study enrollment, and 87% reported having health insurance for their child. Demographics and other characteristics of the sample are shown in Table 1 by group. No statistically significant socio-demographic differences were found between groups.

Ninety-eight percent of those in the educational plus text messaging group reported getting the first dose of the vaccine for their youngest eligible child and 87% in the educational group only ($p = 0.11$). The remainder reported not providing the vaccine within 6 weeks after the initial participation in the study and were not subsequently followed. Of those who received the first dose, 88% in the text messaging group reported receipt by their child of the full three doses and 40% in the education only group ($p = 0.004$). Of those that completed the vaccination series, 45% in the text messaging group and 40% in the education only group were boys ($p = 0.56$).

Table 1
Socio-demographic characteristics by group (N = 69).

	Educational session alone (n = 24)	Educational session plus text messaging (n = 45)	p-Value
Gender			
Female	83%	78%	0.75
Age (mean)	34	37	0.08
Education level			
0 to 5th grade	13%	5%	
5th grade to 11th grade	58%	69%	
Completed high school or above	29%	26%	0.55
Years in the US			
Less than 5 years	71%	64%	
5 or more years	29%	36%	0.59
English proficiency			
Less than very well	88%	91%	
Very well	12%	9%	0.58
Total # of vaccine eligible children			
1	54%	42%	
2	42%	36%	
3	4%	15%	
4	0%	7%	0.26
Youngest vaccine eligible child			
Son	42%	47%	
Daughter	58%	53%	0.89
Youngest vaccine eligible child			
Insured	92%	85%	0.48
Youngest vaccine eligible child			
Has regular source of care	100%	98%	1.00
HPV vaccine awareness[a]			
Yes	29%	22%	0.51

[a] HPV vaccine awareness prior to participating in the study.

Because interest in the study was high and recruitment continued past 25 for the group receiving text messaging, we compared the vaccination rate for the first 25 participants in this group versus the rate among the group receiving parental education alone. The rate of vaccination completion for the first 25 participants in the text messaging group was 82% among those that received the first dose, compared to 40% among those in the education only group ($p = 0.037$).

Vaccination completion was associated with parents' age (38-year old mean age among those that reported vaccinating their child vs. 34-year old mean age among those that did not, ($p = 0.012$)) and with awareness of the vaccine before participating in the study (51% were aware of the vaccine and reported vaccinating their child vs 38% that were not aware and reported vaccinating their child ($p = 0.018$)). No other variables, including parent's gender, years in the U.S., parent's education level, parent's English proficiency, total number of children eligible for the vaccine and gender of the youngest vaccine eligible child, were significantly associated with vaccination series completion.

Using a binary logistic regression analysis to calculate likelihood of vaccination in the entire sample, we found that those in the text message group were 15.5 times more likely to complete the vaccination (3 doses) than those in the education only group ($p < 0.001$). Other variables although not found to be statistically significantly associated with the outcome were included in the equation since, based on current published evidence, they have the potential to modify the association within the intervention and the outcome (Kessels et al., 2012; Reiter et al., 2013; Allen et al., 2012). These variables included gender of parent, gender of youngest HPV eligible child, age of parent, English proficiency of parent and if parent had any knowledge about the HPV vaccine prior to the study (none statistically significant). Results are shown in Table 2. The equation's overall success rate (or prediction of

Table 2
Binary logistic regression equation.

Predictor	B	Wald X^2	p	Exp(B)
Text/no text group	2.72	14.22	<.001	15.2
Parent's gender	1.25	2.28	0.13	3.50
Gender of youngest eligible child	−0.06	0.009	0.92	0.93
Age of parent	0.10	2.62	0.10	1.11
English proficiency of parent	0.28	0.13	0.71	1.32
Parent's prior HPV vaccine knowledge	−0.79	1.07	0.30	0.45

vaccination completion) was 80%, with a sensitivity of prediction of 85.7% and a specificity of prediction of 73.3%.

Discussion

HPV-related cancers are highly preventable, yet are unnecessarily rampant among Mexican immigrants and other minority populations. Our study used an inexpensive, simple intervention, parental education plus text messaging reminders, to increase vaccine initiation and completion rates among vaccine-eligible Mexican American children. As described in the literature, HPV vaccination rates have remained low and are well below the Healthy People 2020 goal of 80% (Center for Disease Control P, 2013; Centers or Disease Control and Prevention, 2012; U.S. Department of Health and Human Services, 2013). Our study, although of feasibility in nature, found an 84% series completion rate for those receiving the text message reminders, a highly significant association between intervention and vaccination rate ($P < 0.00$) and an increase from current vaccination levels.

Increasing rates of HPV vaccination in the U.S. has proven to be difficult, particularly among minority and high risk populations. Vaccination rates remained flat last year, and overall the vaccination completion rates have not passed the 45% mark, even in the general eligible population (Center for Disease Control P, 2013; Centers or Disease Control and Prevention, 2012). This evidence increases the urgency to develop and implement novel and tailored interventions to increase vaccination rates, to potentially prevent over 60% HPV related cancer cases in the U.S. In this study we sought to address the lack of awareness about the vaccine and the reduction in the rates of adherence after the first vaccine dose by educating the population, and by then providing a reminder system using an inexpensive modality widely employed by the population, text messaging. We believe our results are compelling and show that this approach has the potential to overcome most of the salient vaccine barriers in the Latino population, increasing the vaccination rate. The results presented in this pilot study provide strong evidence to support an effectiveness study, with a rigorous methodology, to assess the effect of this type of interventions, implemented in community settings, on HPV vaccination rates.

In a 2013 report, the Centers for Disease Control and Prevention found that 84% of unvaccinated eligible girls reported a healthcare encounter where they received a vaccine other than that for HPV (Center for Disease Control P, 2013). Our study aimed at addressing this missed opportunity for vaccination by increasing parental awareness about the vaccine and encouraging parents to ask their child's provider for the vaccine. Our rates of adherence to the first doses of the vaccine for both groups (above 80% in each group) suggest that this is a viable intervention, although of short lasting effect. The addition of text messaging as a reminder system for the second and third doses seemed to improve the education and awareness effect, sustaining the vaccination rates through the second and third doses with a small dropout, although no causality can be assessed in this pilot study.

We believe our results provide the evidence to support the implementation of interventions to increase HPV vaccination rates in non-clinical settings. Community health programs, such as the one offered at the Mexican Consulate, provide a safe and secure environment in which to disseminate information and implement behavioral interventions. The Mexican Consulate, for example, operates Health Windows in over fifty consulates across the United States, reaching tens of thousands of families each year. Other high risk groups have similar trusted community structures that can facilitate HPV vaccine education and reminder systems. Future efforts to increase HPV vaccination rates should target these settings, particularly among minority and immigrant populations.

Our study has some limitations, the major one stems from the use of participant self-report to determine the outcome, although the same methodology was used across both groups. Another limitation is the small sample size. Additionally, the lack of random assignment increases the potential for selection bias. Furthermore, participants in this study could have been highly motivated to vaccinate their children before participation in the study, reducing the generalizability of our findings. Although our results show the intervention, particularly the text messaging reminder, as the most significant factor associated with vaccination completion, all participants received frequent calls to evaluate the outcomes, and this in turn, could be a potential confounder. Finally, although we found no significant statistical differences between the study populations in each group, some intrinsic differences could exist and could potentially influence the findings.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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