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Evaluating the Effectiveness of Human Papillomavirus Educational Intervention among Oral Health Professionals

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Abstract

This study aims to evaluate the effectiveness of an educational intervention that was designed to increase human papillomavirus (HPV) awareness and knowledge among oral health providers (OHPs). HPV educational lectures and a dental information toolkit on HPV were offered to OHPs in New England in 2016–2017. OHPs included dentists and dental hygienists. Post intervention surveys were distributed 1 month later. A total of 230 participants attended the educational lectures and received the toolkit. Descriptive statistics were used to compare the difference in knowledge and preparedness about HPV before and after the intervention. Eighty-nine OHPs completed the surveys. The response rate was 38.7%; however, for each question, the number of responses varied. Fifty-four (54%) ($n = 26$) of survey respondents were between 55 and 75 years of age with 73.5% ($n = 36$) being female and 55% ($n = 45$) working in private practice. Post intervention, 67.5% ($n = 27$) of the respondents felt more prepared, 82.6% ($n = 38$) reported clarity of their roles in educating their patients about HPV, and 91.6% ($n = 44$) reported an increase in knowledge about HPV. The HPV educational intervention was well received and successful at improving self-reported knowledge, comfort level, and preparedness of OHPs in discussing HPV with their patients. OHPs have the great opportunity to educate their patients about HPV and HPV vaccination. Further continuing education efforts may improve OHPs' participation in HPV prevention.

Keywords Human papilloma virus (HPV) · Oropharyngeal cancer (OPC) · Oral health professionals (OHP)

Background

Human papillomavirus (HPV) infection is the most common sexually transmitted infection. The prevalence of any oral HPV infection is estimated to be 7.3% (4% for high-risk HPV types) among adults 18–69 years old [1]. Oral HPV infections are more prevalent in men as compared to women (7.3 vs. 1.4%) [2]. High-risk HPV types are associated with cancers at different anatomic sites and include HPV-16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 66, or 68 [1]. High-risk oral HPV infection is significantly associated with tobacco smoking; marijuana use; sexual behavior (marital status, number of sex partners, oral sex, and anal sex); and HIV [2–5].

HPV is associated with the majority of newly diagnosed oropharyngeal cancers (OPC) in the USA (approximately 70%) [6–9]. The incidence of HPV-related OPC has steadily increased over the past 30 years [10–12]. Persistent HPV oral infections (particularly HPV-16 and HPV-18, which are oncogenic/high risk) are the leading cause of HPV-associated OPCs [13–15].

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In 2006, the Food and Drug Administration (FDA) approved a vaccine for the prevention of HPV-related infections and cervical cancer [16, 17], which may also protect from oral HPV infections and potentially OPCs. In a study by Hirth et al., the prevalence of "vaccine type" (HPV-6, 11, 16, 18) HPV infections was significantly lower in vaccinated adults (compared to non-vaccinated adults), regardless of gender [18]. Similarly, a recent study by Gillison et al. showed an 88% reduction in the prevalence of oral HPV 16, 18, 6, and 11 infections among individuals who received at least one dose of the HPV vaccine, with population weighted prevalence of these infections in vaccinated men as compared to non-vaccinated men being 0.11 vs. 1.61%; ($P = 0.008$) [19, 20].

Oral health professionals (OHPs) have played significant counseling roles in tobacco cessation programs and therefore could be an excellent resource for promoting HPV prevention [21–23]. OHPs typically see patients twice as often as primary care providers and perform comprehensive oral cancer screenings for their patients [24–26]. However, studies have shown that OHPs are not always confident talking to their patients about HPV [27]. Lack of access to proper information about HPV-related OPC, reimbursement, and parental concerns were some barriers listed [28–31].

To the best of our knowledge, the literature does not show any evidence of previous interventions/efforts to increase OHPs' knowledge, attitudes, and practices with regard to HPV vaccination. As such, the objective of this project was to assess the effectiveness of an HPV educational intervention on self-reported knowledge, attitude, and comfort levels of OHPs in being able to talk to their patients regarding HPV. The ultimate goal of the project was to increase HPV awareness and knowledge among OHPs and for them to promote HPV vaccination in their patients.

Methods

Description of the Intervention

A total of six HPV educational lectures were conducted in six different cities in New England in 2016 and 2017. Participants included dentists and dental hygienists. The educational lectures were mostly approximately 2-h long and were presented by one of the investigators (A.V.). These focused on the role of HPV in OPCs, HPV vaccination, and how to discuss HPV vaccination with patients based on the Centers for Disease Control and Prevention (CDC) recommendations [32]. At the end of each lecture, all participants received an educational toolkit on HPV (Fig. 1). A detailed description of the toolkit has been reported previously [33]. Briefly, the educational toolkit contained office brochures, tear off pads with information about HPV vaccines, talking tips for interacting with patients, and posters for the dental practice. Participants were then asked to complete an online survey using Qualtrics [34] 1 month after attending the lecture. An informed consent for the participants was obtained before beginning the survey. The survey included 29 items on HPV knowledge and awareness (Tables 1, 2, 3, and 4) among OHPs [35]. The survey was distributed 1 month after the educational intervention to capture any change in attitude of the OHPs towards HPV prevention. Reminder emails to complete the survey were sent twice at 4-week intervals. Follow-up telephone calls were also made

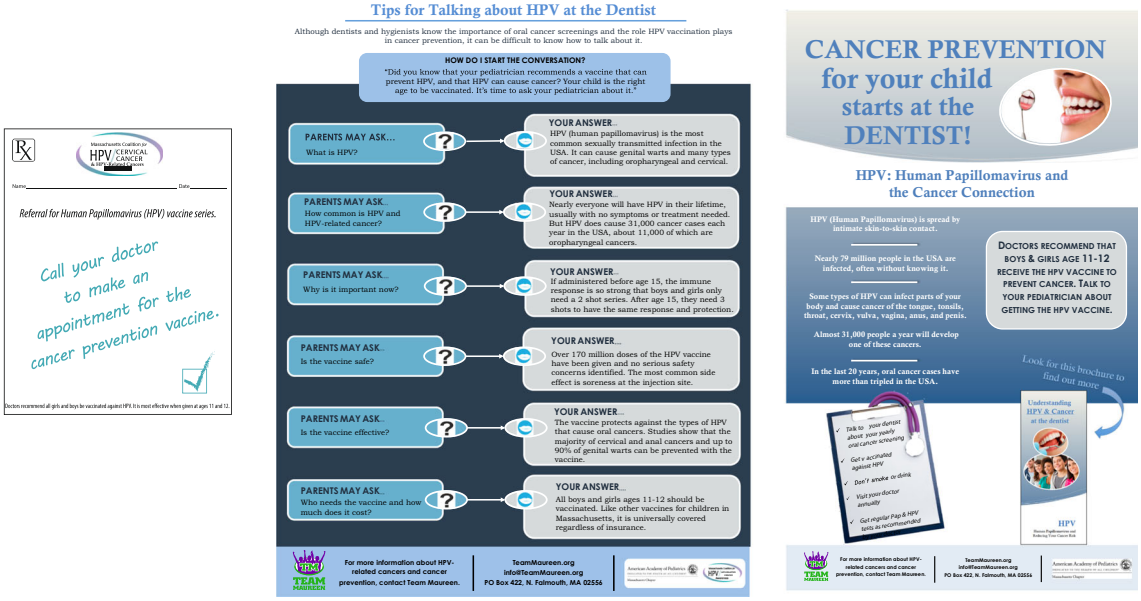

Fig. 1 The Educational toolkit on HPV used in the study

Table 1 Demographic characteristics

	Number (%)
Age range (years)	
< 35	3 (6.1)
35–55	20 (40.8)
55–75	26 (53.1)
Gender	
Male	13 (26.5)
Female	36 (73.5)
Education level (professional degree)	
Dentists	23 (44.2)
RDH dental hygiene	22 (42.3)
Other	7 (13.5)
Type of practice	
Private practice	45 (59.2)
Public health	24 (31.6)
Other (education, research)	7 (9.2)
Race/ethnicities of patient population	
Asian	13 (14.6)
Black or African-American	13 (14.6)
White	48 (53.9)
Hispanic/Latino	11 (12.4)
Other (Native Hawaiian, Pacific Islander, Cape Verdean)	4 (4.5)

Percentage is calculated by dividing the number of respondents for each category of the question by the total number of respondents for that question

Race/ethnicity questions are not mutually exclusive

The above responses do not include missing numbers

RDH registered dental hygienist, *N* number of those who responded to these survey questions

Table 2 Background questions on HPV

	Number (%)
Do you talk with your patients about the association between HPV and oral cancer?	
Yes	33 (67.3)
No	16 (32.7)
How frequently do you perform oral cancer extra/intra oral exam/oral cancer screening during routine dental visits, for your patients?	
Annually	3 (6.1)
Semi-annually	46 (93.9)
Have any of your patients received the HPV vaccine after your discussion with them about the HPV in the clinic?	
Yes	7 (14.3)
No	6 (12.2)
No track	36 (73.5)
If you educate your patients on HPV prevention, how much time on an average do you spend talking with your patients during a routine preventive care visit?	
Less than 5 min	35 (85.4)
5–10 min	6 (14.6)
Do you feel that training dental auxiliaries (dental assistants/front desk staff) at your clinic, about HPV might increase HPV vaccination promotion rates (in this profession)?	
Yes	33 (75.0)
No	11 (25.0)
If HPV prevention education were to be reimbursed, which of the following would best describe its impact on your willingness to provide HPV education?	
Reimbursement would have significant impact	16 (35.6)
Reimbursement would have no impact	29 (64.4)
In your opinion, which one of these strategies or materials influence patients' attitudes and opinions regarding HPV vaccinations?	
Information pamphlet	8 (18.6)
Audiovisual aids	3 (7.0)
Office conversation	12 (27.9)
Pediatrician's recommendations	12 (27.9)
Others (social media, family)	8 (18.6)
In your opinion, what are the barriers preventing dental professionals from recommending HPV vaccines?	
Role uncertainty	18 (22.0)
Inadequate knowledge about HPV	15 (18.3)
Reimbursement	5 (6.1)
Difficulty in initiating a conversation	21 (25.5)
Time consuming	8 (9.8)
Do not want to jeopardize patient relationship	6 (7.3)
Other	9 (11.0)

Percentage is calculated by dividing the number of respondents for each category of the question by the total number of respondents for that question

The above responses do not include missing numbers

N number of those who responded to these survey questions

twice after 3 months, 2 weeks apart. The deadline for the completion of the survey was 4 months after the date of the educational lecture. This study was approved by the Harvard Medical School Institutional Review Board.

Participants

A total of 230 OHPs attended the oral HPV educational lectures. The sample for this study included all the participants who attended the lecture, received a toolkit, and completed the follow-up survey before the expiration of the deadline. We excluded participants who attended the educational lecture but did not complete the follow up survey.

Pilot Test

The questionnaire was validated using face and content validity among the participants by two investigators (A.S. and A.V.). The questionnaire was evaluated in terms of feasibility, readability, clarity of words, and layout or style by experts on the subject. The questionnaire was pilot tested on a group of

Table 3 Toolkit questions

	Number (%)
What components of the toolkit are you currently using in your office? (Please check all that apply)	
Brochure	17 (33.3)
Poster	8 (15.7)
Talking tips sheet	7 (13.7)
Tear off Rx Pad	4 (7.8)
Nothing	15 (29.4)
Which components of the toolkit did you like or think worked well?	
Brochure	15 (40.5)
Poster	3 (8.1)
Talking tips sheet	9 (24.3)
Tear off Rx Pad	2 (5.4)
Nothing	8 (21.6)
Overall, how satisfied are you with the Toolkit?	
Satisfied	27 (62.7)
Neither satisfied nor unsatisfied	14 (32.6)
Unsatisfied	2 (4.6)

Percentage is calculated by dividing the number of respondents for each category of the question by the total number of respondents for that question

The above responses do not include missing numbers

N number of those who responded to these survey questions

Table 4 Before and after intervention comparison questions

	Number (%)
Did the educational seminar on HPV and cancer prevention that you attended and the toolkit you received increase your knowledge of HPV?	
Yes	44 (91.7)
No	4 (8.3)
Before receiving the HPV dental toolkit, which of the following best describes your interaction with patients during routine preventive care visits, about HPV and its prevention?	
Always/almost always	6 (12.5)
Rarely	24 (50.0)
Never	18 (37.5)
After receiving the HPV dental toolkit, which of the following best describes your interaction with patients about HPV and its prevention?	
Always	24 (50.0)
Rarely	16 (33.3)
Never	8 (16.7)
Prior to receiving the training/toolkit, how prepared or comfortable were you to talk about HPV with your patients?	
Prepared	11 (26.2)
Neither prepared nor underprepared	16 (38.1)
Underprepared	15 (35.7)
After receiving the training/toolkit, how prepared or comfortable do you feel to talk about HPV with your patients?	
Prepared	27 (67.5)
Neither prepared nor underprepared	10 (25.0)
Underprepared	3 (7.5)
Did the HPV educational intervention clarify your role in educating your patients about HPV?	
Yes	38 (82.6)
No	8 (17.4)

Percentage is calculated by dividing the number of respondents for each category of the question by the total number of respondents for that question

The above responses do not include missing numbers

N number of those who responded to these survey questions

volunteer participants ($n = 15$) who attended one of the HPV lectures in the previous year and were not part of our study [36].

Statistical Analysis

Descriptive statistics were used to calculate the change in knowledge, comfort, and preparedness among oral health providers in being able to talk to their patients about HPV. Initial descriptive results were generated by Qualtrics [34] and additional analyses were conducted in SAS version 9.4.

Results

Participants

A total of 89 out of 230 dental providers (38.7%) who attended the lecture and received the toolkit responded to the survey. This number includes everyone who completed the survey partially or in full. Different questions on the survey had differential response rates as outlined in the tables. A within-subject analysis was performed and the comparison was made for the same individuals. The majority of respondents were female (73.5%; $n = 36/49$) and 53.1% ($n = 26/49$) were between 55 and 75 years of age. More than half 53.9% ($n = 48/89$) of the participants were White, 14.6% ($n = 13/89$) Asian, 14.6% ($n = 13/89$) African-American, and 12.4% ($n = 11/89$) Hispanic. A large proportion of respondents were dentists (44.2%) followed by dental hygienists (42.3%), and the remaining participants 13.5% ($n = 7/52$) did not indicate their professional degree. In addition, over half 59.2% ($n = 45/76$) of the respondents reported that they were in private practice,

31.6% ($n = 24/76$) in public health, and 9.2% ($n = 7/76$) reported "other" (education, research) (Table 1).

Almost all respondents 93.9% ($n = 46/49$) reported routinely performing oral cancer screening examinations on their patients every 6 months. The majority 67.3% ($n = 33/49$) of the respondents also reported talking with their patients about the association between HPV and OPC. Most of the providers 85.4% ($n = 35/41$) spent less than 5 min talking to their patients about HPV. A small percentage of OHPs 14.3% ($n = 7/49$) reported that their patients received the HPV vaccine after their discussion about the HPV in the clinic (Table 2).

Assessment of Facilitators and Barriers in HPV Prevention and Questions Relevant to the Toolkit

The top strategies that influenced the patients' attitudes and opinions regarding HPV vaccinations, as perceived by respondents, were conversations at the dental visit 27.9% ($n = 12/43$) and pediatrician's recommendations 27.9% ($n = 12/43$). Difficulty in initiating a conversation on HPV was a barrier for 26% ($n = 21/82$) of the respondents, while role uncertainty was a reported barrier for 22% ($n = 18/82$) of them. Seventy-five percent ($n = 33/44$) of the respondents felt training dental auxiliaries (dental assistants/front desk staff) about HPV might also contribute to increased HPV awareness and vaccination rates. Reimbursement for the service was a barrier reported by 6% ($n = 5/82$) of the respondents. Nearly two thirds (64.4%) ($n = 29/45$) of respondents reported that reimbursement would have no impact on their willingness to provide HPV education (Table 2).

When asked which component of the educational toolkit they liked best, a large proportion 40.5% ($n = 15/37$) of the respondents reported that they liked the brochure component of the toolkit the most compared to talking tips sheet (24.3%; $n = 9/37$) and posters (8.1%; $n = 3/37$). The brochure was the component most of the respondents were currently using in their office 33.3% ($n = 17/51$). Overall 62.7% ($n = 27/43$) of the survey respondents were satisfied with the toolkit (Table 3).

Comparison of Pre and Post Intervention

Before receiving the HPV dental toolkit, only 12.5% ($n = 6/48$) OHPs reported that they almost always interacted with patients during routine preventive care visits about HPV and its prevention. When cross tabulated, three of those professionals were dental hygienists, two were dentists, while one of the respondents did not mention their primary degree. After the educational intervention, there was a self-reported 37.5% increase in interaction with patients about HPV and vaccination. Seven of the responders were dental hygienists and six of them were dentists. Prior to receiving the training/toolkit, only 26.2% ($n = 11/42$) of the OHPs felt prepared or comfortable to talk about HPV with their patients. Post intervention, 67.5% ($n = 27/40$) of the respondents reported they felt more prepared in talking about HPV with their patients, 82.6% ($n = 38/46$) reported the educational intervention clarified their role in educating their patients about HPV, and 91.6% ($n = 44/48$) reported an increase in knowledge about HPV (Table 4).

Discussion

This study was one of the first among few others [37–40] that identified a possible role for OHPs in HPV prevention. Our main goal was to increase HPV awareness and vaccination rates. Our proposed educational intervention [33] was effective in improving the self-reported knowledge, comfort levels, and preparedness among OHPs in being able to talk to their patients about the association between HPV, cancer, and HPV vaccination. When surveyed after the educational interventions, OHPs reported an increased patient interaction regarding HPV prevention (37.5%). In addition, almost two thirds of the OHPs felt more prepared and knowledgeable about HPV, and also realized the importance of their roles in the promotion of HPV prevention strategies, including vaccination.

The findings in our study were comparable to previous studies conducted on this topic [28, 41, 42]. Our respondent population was mostly comprised of OHPs who were 55–75 years old and in private practice. Other studies support our findings that increased age of the OHPs is correlated to the concept of discussion of sexual health and considering it within the scope of OHP practice [41]. Older OHPs were found to be more interested and accepting of this expanded scope of practice. Major barriers faced by OHPs in advocating for HPV prevention include considering the topic stigmatizing, difficulty in initiating a conversation, and role confusion. These barriers have also been reported in a study by Vasquez et al. which described patient factors like age (teenage or young adults) and practice factors like open operatories (which meant less privacy as compared to closed operatories) also factor into OHPs being able to discuss this topic with patients [28]. Interestingly, the majority of the OHPs did not think reimbursement for this service was necessary. However, other studies have found that reimbursement may negatively affect the provider's recommendation of HPV vaccine [29]. The reason behind this difference in our study may be that the sample size was small and may not be completely representative of the population in question. Dental hygienists have shown less participation in HPV prevention discussions with their patients in previous studies [42]. This, however, was not true for our study.

There were some limitations in our study. First, our work had a small sample size and was cross-sectional in nature. As such, it may have not been representative of all OHPs in the New England area in general. An additional limitation for this

study was selection bias. Presumably, the subject voluntarily enrolled in the HPV and cancer prevention seminars, which means that they already were interested in the topic and perhaps more receptive to the educational intervention. Secondly, the survey had a different response rates for different questions for unknown reasons; but this did lead to response bias which may have partially skewed our results. Last of all, to measure the effectiveness of the educational intervention, a randomized control trial would have been ideal. This was not possible because of cost and time limitations. Since we only looked at post intervention survey data, there is a possibility of a recall bias. In future studies, we will compare both pre and post intervention knowledge, comfort levels, and preparedness of the OHPs about HPV prevention for better assessment of effectiveness. In addition, we will evaluate the impact of our program in improving the vaccination rates for HPV.

Practice Implications

Adequate training and education may help OHPs feel comfortable in offering HPV prevention counseling for their patients. Considering the oral and systemic connection regarding HPV and the fact that the patients see their OHPs twice as much as their primary care providers, involvement of OHPs in this process would greatly benefit the cause.

Conclusion

OHPs have reported varied knowledge, comfort levels, and preparedness about HPV when it came to counseling their patients. Our educational intervention focused on HPV-related disease prevention and HPV vaccination programs. They also had a component that focused on improving the awareness, knowledge base, and comfort level of OHPs to feel better equipped to promote HPV prevention. OHPs have started to identify their roles in the HPV prevention programs. The Association of State and Territorial Dental Directors (ASTDD) has endorsed promotion of the HPV vaccine and supports ongoing efforts of HPV education for OHP's and other health professions [43]. Furthermore, as more trusted professional organizations begin to clarify their position on HPV vaccination, the expanse of information will reach more providers. Further studies may be useful in improving ways to involve more OHPs in being able to control this deadly, preventable disease.

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