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Are dental providers the next line of HPV-related prevention? Providers' perceived role and needs



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ABSTRACT

The rise in HPV-related oropharyngeal cancer incidence necessitates novel prevention efforts including multiple provider types. Although dental providers screen for HPV-related oropharyngeal cancers, little is known about their needs to advance “primordial prevention,” or interventions at the earliest possible stage, to prevent HPV-related cancers. This study assessed dentists' and dental hygienists' perceived roles and needs regarding HPV-related primordial prevention.

We conducted a mixed-method study with data from focus groups with dentists (n = 33) and dental hygienists (n = 48) and surveys from both provider types (n = 203) among providers from a diverse set of practice settings and geographic communities. Data were analyzed using qualitative thematic analysis and chi square tests.

Participants affirmed dental professionals' roles in preventing HPV-related cancers and identified needs to overcome barriers to fulfilling prevention objectives. Barriers included: (1) practice environment and patient characteristics, and (2) the sensitive topic of HPV. Further, participants identified needs to improve HPV-related cancer prevention.

Findings from this study suggest that dental providers may become the next line of prevention for HPV-related cancers. Dental providers' professional associations have provided guidance on HPV and oropharyngeal cancers, but our study reveals dental providers' needs for following professional organizations' guidance to advance prevention efforts and reduce HPV-related cancer incidence.

1. Introduction

Over the past 30 years, oral cancer incidence in the United States has decreased due to reducing tobacco exposure [1]. Nonetheless, the incidence of a subset of human papillomavirus (HPV)-related oropharyngeal cancers is on the rise [2], with evidence indicating that the relationship between HPV and oropharyngeal cancers is an emerging public health concern [3]. Between 1984 and 1989 the prevalence of HPV among oropharyngeal cancers was 16.3%, increasing dramatically to 72.7% during 2000–2004 [2]. Data from 2008 to 2012 revealed that oropharyngeal cancers were the one of the most common HPV-associated cancers with an average of 11,000 cancers annually estimated to

be HPV-attributable (2000 for females and 9100 for males) [4]. In 2009, new cases of oropharyngeal cancers accounted for 37.3% of all HPV-associated cancers, whereas cervical cancer represented 32.7% of all HPV-associated cancers [5]. Further, approximately 63% [95% CI 50–75%] of all oropharyngeal cancers are attributable to HPV and may be *preventable* [6,7], demonstrating a need for public health interventions to reduce HPV-related oropharyngeal cancer incidence. In response to HPV-related oropharyngeal cancers as a growing public health concern, the American Dental Association (ADA) released a statement instructing dental providers “to educate themselves and their patients about the relationship between HPV and oropharyngeal cancer [8]”. The dental profession has historically been involved in prevention

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efforts related to a number of health concerns, including tobacco use, diabetes, cardiovascular disease, human immunodeficiency virus, and disordered eating [9–15]. Dental providers have engaged in secondary prevention methods related to HPV and oropharyngeal cancer, and may be well positioned to engage in other HPV-related prevention efforts. Several HPV-related cancers (e.g., anogenital) can be prevented through HPV vaccination, which can protect against up to 9 types of HPV including those primarily responsible for cancer (i.e., HPV 16 and 18). The HPV vaccine is licensed for males and females 9–26 years of age, but recommended for 11 and 12-year-old adolescents [16,17]. Although the vaccine is not yet approved for preventing HPV-related oropharyngeal cancers, molecular and epidemiological data support a causal role for HPV in oropharyngeal cancers [18] and the ADA has called for additional research to investigate the efficacy of HPV vaccines for preventing oropharyngeal cancers [8].

Given the connection between HPV and oropharyngeal cancer and oral health professional organizations' statements about HPV-related prevention efforts, dental providers may be the next line in HPV prevention. While dental providers already screen for oral cancer, their prevention efforts can expand to education and recommendations regarding additional prevention efforts such as the HPV vaccine [6]. Previous studies have shown that dental patients have significant informational needs related to HPV and oral cancers [19]. Acknowledging patients' knowledge gaps and the increasing awareness about HPV vaccines, researchers have suggested that the causative link between HPV and oropharyngeal cancer and the availability of HPV vaccines may result in larger numbers of dental patients seeking information about HPV vaccination as a way to prevent oral cancer infections [20,21]. This possibility requires dental providers be prepared to answer patients' questions about HPV and educate them about the connection between HPV and oropharyngeal cancer [22]. Accordingly, researchers have argued that oral health professionals "can take the lead in confronting the HPV- oropharyngeal cancer epidemic" [23], especially through interprofessional collaboration, such as referring patients to relevant clinicians to receive vaccinations and any needed follow-up care [23]. Interprofessional collaboration highlights some dental providers' acceptance of HPV vaccination efforts, but existing evidence suggests that large numbers of current and future dental providers are not yet ready to discuss HPV vaccines with patients [24], and dental students have expressed willingness to discuss HPV with patients but still have concerns about information deficits [25,26]. Discussing HPV with patients would allow dental providers to engage in primordial prevention efforts—a form of "intervention at the most distal point in the chain of causality" [27] that focuses on preventing risk factors and the social and environmental conditions that lead to disease [28].

Whereas screening for HPV-related cancers consists secondary prevention, and vaccination would constitute primary prevention, primordial prevention would encompass educating patients about HPV. Primordial prevention has proven effective in intervening in health concerns that have oral-systemic health links, such as cardiovascular disease [29]. Moreover, primordial prevention is consistent with dental providers' professional practice since preventing health concerns as early as possible fits into oral health efforts that focus on early prevention, such as ensuring children have sufficient exposure to fluoride to prevent carries. However, without understanding dental providers' needs for having HPV-related conversations with patients, and their perceived roles as primordial prevention agents in HPV-related oropharyngeal cancer, improving patient care and changing clinical practice related to this issue will remain challenging. With the ADA recommendation for dental providers to educate their patients, the purpose of this study was to assess dentists' and dental hygienists' perceived roles in HPV prevention and their needs in order to discuss HPV-related oropharyngeal cancer prevention with their patients. Understanding providers' roles and needs can facilitate efforts to address providers' needs and ultimately influence practice efforts to prevent

HPV-related oropharyngeal cancer and thus improve patient outcomes.

2. Methods

2.1. Overview

We used a mixed-method approach to guide this study since dental practices fit within a complex system, including different provider types (e.g., dentist, dental hygienist, dental assistant), practice structures (e.g., private, public), and associations with professional organizations [30]. Accordingly, this study included stakeholders representing these different system levels to understand oral health providers' needs in effectively discussing HPV prevention with patients. Specifically, this study included two data collection types: (a) focus groups with dentists and dental hygienists; and (b) surveys with dentists and dental hygienists. This approach was used to compare, contrast, and triangulate data to ensure accuracy of results and provide an in-depth approach to understanding dental providers' roles in HPV prevention [31]. The university's Institutional Review Board approved this study.

2.2. Participants and inclusion criteria

Dentists attending a regional conference in the Southeastern United States and dental hygienists attending a national US conference were recruited to participate in focus groups in 2016 and 2015, respectively. Conference organizers sent recruitment emails to all registered attendees. Inclusion criteria were: (a) possess a current dental/dental hygiene license; (b) graduate of an accredited US dental/dental hygiene program; (c) in practice for more than one year; and, (d) over 21 years of age. Four focus groups were conducted with 8–10 dentists each (N = 33) and four focus groups were conducted with 10–12 dental hygienists (N = 48). Participants completed a demographic questionnaire asking identified gender, race and ethnicity, age, number of years in practice, and practice type (private, public, combination, other). During the focus groups, participants were asked to describe what they need to facilitate a discussion of HPV and oral cancer risks with their patients.

As part of four continuing education sessions on HPV-related oropharyngeal cancer at the large, regional dental conference where dentists were recruited, attendees were asked to complete a pre- and post-test. A total of 55 dentists and 228 dental hygienists initiated at least some part of the surveys; however, for the purpose of this analysis, the sample was restricted to those completing key questions from the pre-test: roles and needs for HPV discussion, and barriers and facilitators for HPV discussion. The survey questions and focus group guide were informed by preliminary interviews with key opinion leaders in the dental profession, including leaders of professional organizations and governmental agencies. We adopted this approach by following the diffusion of innovations theory, which considers how health-related innovations are disseminated and suggests opinion leaders can play a role in dissemination and have unique insights [32,33]. Dentists (n = 37) and dental hygienists (n = 166) completed these sections of the paper-and-pencil survey. Individual names and the name of the conference participants attended have been omitted to protect participants' identities.

2.3. Analysis

Data were analyzed using both qualitative and quantitative methods. The qualitative focus groups were audio-recorded and transcribed verbatim. We used a thematic analysis approach to analyze qualitative data, which involves systematically identifying and quantifying major themes [34], allowing us to inductively identify the primary needs for discussing HPV and oral cancer with patients. The quantitative survey data were transferred to an electronic database. Frequencies for each type of barrier/facilitator were calculated and chi-

Table 1
Demographic and practice characteristics of dental providers participating in mixed-methods study.

Samples	Dentists in Focus Groups (N = 33)	Dental Hygienists in Focus Groups (N = 48)	Dentists from Surveys (N = 37)	Dental Hygienists from Surveys (N = 166)
Gender n(%)				
Male	19 (58%)	0 (0%)	17 (46%)	2 (1%)
Female	14 (42%)	48 (100%)	20 (54%)	164 (99%)
Age mean(sd)	46.9 (13.1)	45.7 (12.0)	47.8 (13.4)	40.4 (10.7)
Race n(%)				
White	21 (64%)	43 (90%)	29 (78%)	131 (79%)
Black	5 (15%)	2 (4%)	6 (6%)	18 (11%)
Asian	4 (12%)	1 (2%)	0 (0%)	2 (1%)
Other	2 (6%)	2 (4%)	1 (3%)	15 (9%)
Hispanic n(%)				
Yes	1 (3%)	1 (2%)	0 (0%)	8 (5%)
No	32 (97%)	47 (98%)	37 (100%)	158 (95%)
Years in Practice mean(sd)	19.2 (12.3)	20.7 (13.1)	19.8 (12.5)	15.1 (11.2)
Practice Type n (%)				
Private	29 (88%)	29 (60%)	28 (76%)	132 (80%)
Public	10 (30%)	15 (31%)	8 (22%)	28 (17%)
Combination	1 (3%)	2 (4%)	0 (0%)	0 (0%)
Other	2 (6%)	2 (4%)	1 (3%)	6 (4%)

^a One participant did not complete this question.

square tests were used to compare each barrier/facilitator with type of provider. SAS 9.4 was used to conduct this analysis. A p-value less than 0.05 was considered statistically significant.

3. Results

3.1. Demographics

The demographic characteristics of dentists and dental hygienists participating in survey and focus groups are presented in Table 1.

3.2. Perceived role

Participants representing both dentists and dental hygienists affirmed a role for the dental profession in the primordial and secondary prevention of HPV-related oropharyngeal cancer. The majority of dentists and dental hygienists strongly agreed or agreed that they had a role in discussing prevention.

In focus groups, dental hygienists described themselves as “prevention specialists.” This prevention role consisted of educating the patient and doing the oral cancer screening.

“I think it starts with hygienists, and hygienists really believing that that’s true, that we really are preventative specialists. And the dentists and other professionals, medical professionals, and then the patients. We want the patients to believe that, but we all need to believe it first.” (Dental Hygienist, 5 Years in Practice)

Dentists, on the whole, were more focused on secondary prevention of oropharyngeal cancer through oral cancer screening, but recognized a role for HPV vaccine education and recommendation.

“We should educate our own selves as the relationship of HPV and oral cancers, how HPV can be spread from one person to the next, and should be able to discuss that with our patients at a level that we feel comfortable with.” (Dentist, 18 Years in Practice)

3.3. Perceived needs

Though all participant groups identified a role for dental providers in the primary prevention of HPV-related oral cancer (vaccination), they identified needs to overcome barriers in doing so and engaging in primordial prevention efforts. Dentists and dental hygienists were asked to discuss their perceived needs to facilitate discussion of HPV and oropharyngeal cancer with their patients. Three themes emerged across the focus groups: the need for patient awareness, specific types of patient education materials, and professional education focusing on this topic.

3.3.1. Patient awareness

Dentists and dental hygienists described approaches to increase patient awareness regarding HPV and oropharyngeal cancer, including nationwide campaigns, public champions, professional partnerships and targeted strategies for younger audiences. The most salient discussion surrounded the need for patients, rather than providers, to begin conversations about HPV. Participants mentioned patient-initiated conversations would remove their concern of offending or embarrassing patients by bringing up a sensitive topic, and would additionally signal to the provider that the patient is interested in learning more about HPV.

“...a campaign that said HPV is or can cause or may cause oral cancer and this is why talk to your dentist about it. Wouldn’t that drop the barriers? They’d be coming in asking rather than you having to start the conversation with them.” (Dental Hygienist, 40 Years in Practice)

3.3.2. Patient education materials

The second salient theme was the need for more comprehensive, passive, patient education materials on the relationship between HPV and oropharyngeal cancer in order to facilitate the patient beginning the conversation. These materials include pamphlets, posters, frequently asked questions (FAQ)-sheets utilizing plain language, and short videos for the waiting room. Participants believed these passive approaches would provide information on HPV and oropharyngeal cancer to all patients, and thus patients would not be singled out for HPV-related discussions.

“I would like a short, three-minute video. Also, I like information fact sheet, one-page fact sheet at fifth grade reading level. Quick and simple and easy. And then, maybe, some posters saying, “Ask me more” or something like that....” (Dentist, 30 Years in Practice)

3.3.3. Professional education

Participants noted that dental professionals overall lack knowledge about HPV that could be addressed through required continuing education courses. Content should include the relationship between HPV and oropharyngeal cancer, key information to be discussed with patients, and communication skills to approach the subject with their patients. Finally, participants discussed their own personal desire and need for education about this topic to provide the best care to patients. Most participants felt the time they spent with their patients would best be used to educate them.

“I think in dental school, they never really taught you that. They would say “Oh, you should have the conversation”, but nobody ever say “This is how you should have the conversation.” “Oh, you should talk about it.”... but how?” (Dentist, 6 Years in Practice)

Dentists and dental hygienists who completed the survey identified what would make it difficult to discuss HPV and oropharyngeal cancer with patients (Table 2). For dentists, the chief concerns were lack of privacy (54%), fear of offending patients (51%), and patient population and demographics, such as patient age and gender (43%). Dental hygienists’ principal concerns were fear of offending patients (59%), lack

Table 2
Perceived barriers and facilitators to discussion HPV and oropharyngeal cancer with patients as reported by dentists and dental hygienists participating in surveys.

What would make it difficult for you to discuss the connection between HPV and oral Cancer with your patients?			
	Dentists (N = 37)	Dental Hygienists (N = 166)	P-value ^a
Lack of privacy (e.g. open operatory)	20 (54%)	90 (54%)	0.99
Fear of offending patients	19 (51%)	98 (59%)	0.39
Patient population and demographics (e.g. age, gender)	16 (43%)	42 (25%)	0.03
Lack of time	14 (38%)	85 (51%)	0.14
I don't know enough	8 (22%)	45 (27%)	0.79
I don't feel comfortable	6 (16%)	34 (21%)	0.56
What would make it easier for you to discuss the connection between HPV and oral cancer with your patients?			
	Dentists	Dental Hygienists	P-value ^a
Continuing education in journals	35 (95%)	139 (84%)	0.09
Waiting room pamphlets	33 (89%)	149 (90%)	0.92
Technology support materials (e.g. mobile apps, electronic health records)	27 (73%)	117 (71%)	0.76
Office posters	21 (57%)	93 (56%)	0.94
Brief motivational interview training	20 (54%)	86 (52%)	0.80
Communication skill-building (e.g. role-playing)	18 (49%)	79 (48%)	0.91
Waiting room video	17 (46%)	95 (57%)	0.21

^a Chi-square test. P-values less than 0.05 are statistically significant and bold.

of privacy (54%), and lack of time (51%). In response to the question related to facilitators to discussing HPV-oropharyngeal cancer with patients, dentists reported wanting continuing education in journals (95%), waiting room pamphlets (89%), and technology support materials (73%). Dental hygienists identified needing waiting room pamphlets (90%), continuing education in journals (84%), and technology support materials (70%).

4. Discussion

Rising rates of HPV-related oropharyngeal cancer [2] have necessitated discussions among dental providers about their role and perceived needs for addressing this emerging public health concern with their patients. The ADA supports patient-provider conversations about HPV, providing guidance stating dentists should educate themselves and patients about this connection [8]. The current study explored the role and the needs among oral health providers for having discussions with patients and described the barriers and facilitators related to communicating with patients about the relationship between HPV and oropharyngeal cancer.

Among the major findings, key stakeholders and oral health providers participating in the study almost uniformly reported having a role preventing HPV and oropharyngeal cancer. However, participants differed regarding the type of prevention they thought they should engage in. For example, dentists focused on secondary prevention (i.e., oral cancer screening), which is likely attributed to current guidance for oral cancer screenings. In contrast, dental hygienists described a more primordial approach to prevention, which follows current practices of education, oral-systemic discussions, and health behavior change, in addition to cancer screening. This perceived role for prevention may be similar to other oral-systemic prevention activities in the dental setting, such as tobacco cessation [35] and diabetes [36].

As findings from this study show, providers identified barriers for discussing HPV and oropharyngeal cancer prevention that fell into two main categories: (1) practice environment (e.g., open operatory) and

patient characteristics (e.g., age, gender), and (2) the sensitive topic of HPV and oropharyngeal cancer. Participants did not provide any strategies that responded to the first barrier as these were more difficult to alter, but instead focused on strategies that could fit within existing practice structures, such as the creation of passive materials (i.e., pamphlets, videos, posters) that would allow patients rather than providers initiating the conversations. This focus on passive approaches may stem from limited training on HPV and oropharyngeal cancer communication. Accordingly, providers also requested scripting, communication skill-building, and technology support materials to address communication needs. Future prevention efforts responding to such needs can follow existing efforts to increase dental providers' capacity to discuss health concerns with patients that manifest in the mouth, like disordered eating [37,38]. Such efforts should be attentive to findings reported here that show how patient population characteristics influence providers' perceived difficulty in having HPV-related conversations with patients. As such, future prevention efforts may need to vary depending on patient demographics.

Findings from this study can influence practice activities for dental providers who want to engage in primordial HPV-related prevention efforts. Based on focus group and survey data, dental providers wanting to engage in HPV-related primordial prevention can adopt the passive informational prompts identified here, such as using pamphlets, videos, and posters, and have quick resources available about HPV and oropharyngeal cancer. Moreover, since existing research suggests dental providers receive most of their HPV-related knowledge from professional journals and continuing education courses [39], continuing education organizers can consider building role-playing exercises where providers practice conversations with patients into educational opportunities.

Although a strength of the study is the mixed-methods approach, it is not without limitations. The focus group and survey data were collected at professional conferences: the dental hygienists focus groups occurred at a national conference, while the dental focus groups and surveys were collected at a regional conference. This may impact the generalizability of these findings since most conference attendees were from the same region of the country, and specific location information for every attendee was not captured. This approach may also introduce sampling bias as those persons who attend conferences may have different attributes compared to practitioners who chose not to or are unable to attend conferences. Additionally, this study is based on convenience samples of participants (i.e., volunteering for focus groups and attending continuing education sessions where survey data were collected). The study is further limited by the small sample size of respondents who completed the survey, and due to the paper-and-pencil survey methodology, participants were able to skip questions or provide incomplete data. In response to these limitations, we conducted a complete case analysis for presenting these results, which excluded participants with missing data, but future studies could include a more robust sample size of respondents and could involve electronic survey methods that require participants to complete answers before continuing to the next questions. Future studies could also solicit information from providers about the role of dental associations and dental schools in training oral care providers using the tools recommended in this article, and similar studies could also ask participants how often their patients see them, which could help guide screening efforts.

Among the strengths of this study are the practical implications for the dental profession. All stakeholders included in this study (dentists and dental hygienists) felt that this issue is clearly within the scope of the dental profession. Furthermore, dentists and dental hygienists expressed that they were willing to discuss HPV and oropharyngeal cancer prevention with their patients, but that they did not yet feel ready or prepared to do so. Nonetheless, they expressed a recognition that this is an emerging issue that has the potential to impact their patient-provider interaction directly.

5. Conclusion

Researchers have made multiple calls for clinical trials to establish the HPV vaccine's role in preventing oropharyngeal cancer [40], and dental providers will need to be prepared to have conversations with their patients regarding recommendations and referrals for the HPV vaccine. In the meantime, dental providers should continue to screen for HPV-related cancers and become increasingly familiar with additional ways to prevent HPV-related diseases. As public awareness grows about HPV-related oropharyngeal cancer, dental providers may be called upon to provide information, advice and make recommendations to their patients. In this study, key stakeholders from professional organizations, dentists, and dental hygienists confirmed that this is a critical component of their role as oral health providers. In terms of practice implications, providers expressed concerns about how these conversations may affect their patients and practices due to the sensitive nature, yet they requested the materials and skill-building training to facilitate this process. In response to this need, dental organizations and schools may need to be increasingly prepared to provide oral health professionals the informational tools and education needed to discuss HPV with their patients.

Further, dental schools and oral health professional organizations may need to consider HPV vaccination trainings in the event the vaccine is approved for preventing oralpharyngeal cancer. The HPV vaccine program in the U.S. is a provider-based delivery system, meaning that pediatricians, OB/GYN's and family practice physicians vaccinate patients in their practices [17].

Although the HPV vaccine is not yet been approved for the prevention of oropharyngeal cancer, dental providers may well become the next line of prevention of this rapidly increasing oral health concern. Prior to becoming the next line of prevention, however, dental patients must receive clear, scientifically accurate information from their oral health providers, who in turn will need the knowledge and skills to educate patients about HPV and make appropriate recommendations and referrals. More information and training about HPV for dental providers, and directly responding to the needs identified in this paper, may ultimately improve patients' outcomes, prevent the incidence of oropharyngeal cancer from continuing to rise, and further engage dental providers in public health prevention efforts.

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Conflicts of interest

Only one author has a conflict of interest to disclose. [Name removed for review] serves on the U.S HPV Vaccine Advisory Board for Merck Pharmaceuticals. All other authors do not have conflicts of interest to disclose.

References

- [1] E.M. Sturgis, P.M. Cinciripini, Trends in head and neck cancer incidence in relation to smoking prevalence - An emerging epidemic of human papillomavirus-associated cancers? *Cancer* 110 (7) (2007) 1429–1435.
- [2] A.K. Chaturvedi, et al., Human papillomavirus and rising oropharyngeal cancer incidence in the United States, *J. Clin. Oncol.* 29 (32) (2011) 4294–4301.
- [3] M.L. Gillison, et al., Evidence for a causal association between human papillomavirus and a subset of head and neck cancers, *J. Natl. Cancer Inst.* 92 (9) (2000) 709–720.
- [4] L.J. Viens, et al., Human papillomavirus-associated cancers - United States, 2008–2012, *MMWR Morb. Mortal. Wkly Rep.* 65 (26) (2016) 661–666.
- [5] A. Jemal, et al., Annual report to the nation on the status of cancer, 1975–2009, featuring the burden and trends in human papillomavirus(HPV)-associated cancers and HPV vaccination coverage levels, *J. Natl. Cancer Inst.* 105 (3) (2013) 175–201.
- [6] X. Wu, et al., Human papillomavirus-associated cancers-United States, 2004–2008, *MMWR* 61 (15) (2012) 258–261.
- [7] M.L. Gillison, A.K. Chaturvedi, D.R. Lowy, HPV prophylactic vaccines and the potential prevention of noncervical cancers in both men and women, *Cancer* 113 (S10) (2008) 3036–3046.
- [8] American Dental Association. Statement on Human Papillomavirus and Cancers of the Oral Cavity and Oropharynx. [cited 22.05.2013], 2013. Available from: <http://www.ada.org/1749.aspx>.
- [9] R.J. Hastreiter, et al., Use of tobacco prevention and cessation strategies and techniques in the dental office, *J. Am. Dent. Assoc.* 125 (11) (1994) 1475–1484.
- [10] B. Daly, et al., *Essential Dental Public Health*, Oxford University Press, Oxford, 2013.
- [11] H.A. Pollack, et al., Dentists' willingness to provide expanded HIV screening in oral health care settings: results from a nationally representative survey, *Am. J. Public Health* 104 (5) (2014) 872–880.
- [12] M. Bruno, The integration of diet and nutrition lifestyle management strategies into the dental office visit for diabetes risk reduction and management, *J. Am. Dent. Assoc.* 143 (12) (2012) 1320–1323.
- [13] M. Glick, Screening for traditional risk factors for cardiovascular disease: a review for oral health care providers, *J. Am. Dent. Assoc.* 133 (3) (2002) 291–300.
- [14] C.L. Berman, M.A. Guarino, S.M. Giovannoli, High blood pressure detection by dentists, *J. Am. Dent. Assoc.* 87 (2) (1973) 359–363.
- [15] L.M. Abbey, L.H. Kenner, A resurvey of hypertensive patients detected in a dental office screening program, *J. Public Health Dent.* 36 (4) (1976) 244–249.
- [16] E. Petrosky, et al., Use of 9-valent human papillomavirus (HPV) vaccine: updated HPV vaccination recommendations of the Advisory Committee on Immunization Practices, *MMWR Morb. Mortal. Wkly Rep.* 64 (11) (2015) 300–304.
- [17] L.E. Markowitz, et al., Human papillomavirus vaccination, *MMWR Recomm. Rep.* 63 (RR-05) (2014) 1–30.
- [18] M. Gillison, Human papillomavirus-associated head and neck cancer is a distinct epidemiologic, clinical, and molecular entity, *Semin. Oncol.* 31 (6) (2004) 744–754.
- [19] K. Milbury, et al., An exploratory study of the informational and psychosocial needs of patients with human papillomavirus-associated oropharyngeal cancer, *Oral. Oncol.* 49 (11) (2013) 1067–1071.
- [20] K. Ciarrocca, L.L. Jackson, S.S. De Rossi, Human papillomavirus: the fundamentals of HPV for oral health care providers, *J. Calif. Dent. Assoc.* 41 (5) (2013) 349–355.
- [21] E. Daley, et al., Exploring awareness, attitudes, and perceived role among oral health providers regarding HPV-related oral cancers, *J. Public Health Dent.* 71 (2) (2011) 136–142.
- [22] A. Chattopadhyay, D. Weatherspoon, A. Pinto, Human papillomavirus and oral cancer: a primer for dental public health professionals, *Community Dent. Health* 32 (2015) 117–128.
- [23] J.L. Fried, Confronting human papilloma virus/oropharyngeal cancer: a model for interprofessional collaboration, *J. Evid. Based Dent. Pract.* 14 (2014) 136–146 (e1).
- [24] E. Daley, et al., Prevention of HPV-related oral cancer: assessing dentists' readiness, *Public Health* 128 (3) (2014) 231–238.
- [25] M.R. Poelman, et al., Prevention of HPV-related oral cancer by dentists: assessing the opinion of Dutch dental students, *J. Cancer Educ.* (2017) 1–8.
- [26] E.M. Daley, et al., HPV-related knowledge among dentists and dental hygienists, *J. Cancer Educ.* (2016) 1–6.
- [27] B. Starfield, Basic concepts in population health and health care, *J. Epidemiol. Community Health* 55 (7) (2001) 452–454.
- [28] B. Starfield, et al., The concept of prevention: a good idea gone astray? *J. Epidemiol. Community Health* 62 (7) (2008) 580–583.
- [29] A.K. Chomistek, et al., Healthy lifestyle in the primordial prevention of cardiovascular disease among young women, *J. Am. Coll. Cardiol.* 65 (1) (2015) 43–51.
- [30] B.J. Weiner, et al., In search of synergy: strategies for combining interventions at multiple levels, *J. Natl. Cancer Inst. Monogr.* 2012 (44) (2012) 34–41.
- [31] S. Mathison, Why triangulate? *Educ. Res.* 17 (2) (1988) 13–17.
- [32] T.W. Valente, R.L. Davis, Accelerating the diffusion of innovations using opinion leaders, *Ann. Am. Acad. Political Soc. Sci.* 566 (1) (1999) 55–67.
- [33] D.M. Berwick, Disseminating innovations in health care, *JAMA* 289 (15) (2003) 1969–1975.
- [34] G. Guest, K.M. MacQueen, E.E. Namey, *Applied thematic analysis*, sage, 2011.
- [35] P. Prakash, et al., Dentists' attitudes, behaviors, and barriers related to tobacco-use cessation in the dental setting, *J. Public Health Dent.* 73 (2) (2013) 94–102.
- [36] R.J. Genco, et al., Screening for diabetes mellitus in dental practices. *The Journal of the American Dental Association.* 145(1): p. 57-64.
- [37] N. Burkhardt, et al., Communicating effectively with patients suspected of having bulimia nervosa, *J. Am. Dent. Assoc.* 136 (8) (2005) 1130–1137.
- [38] R.D. DeBate, L.A. Tedesco, Increasing dentists' capacity for secondary prevention of eating disorders: identification of training, network, and professional contingencies, *J. Dent. Educ.* 70 (10) (2006) 1066–1075.
- [39] V. Dodd, E. Daley, H. Logan, Discussing the link between HPV and oral cancer: where do we begin? *Today's. FDA: Off. Mon. J. Fla. Dent. Assoc.* 23 (1) (2010) 58–61.
- [40] M. Krakow, B. Rogers, Collateral damage and critical turning points: public health implications of HPV vaccine news coverage for boys and men in 2011, *Health Commun.* (2016) 1–8.