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Knowledge, Perceptions and Behavior Regarding E-cigarettes among Dental Practitioners

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Abstract

Background: The increased use of E-cigarettes represents an emerging concern for dental practitioners with the potential to impact clinical care. The concerns for, and effects of, E-cigarettes remain poorly understood, especially with long-term use.

Methods: Dental practitioners (n = 187) in Bareilly completed a 28-item survey of E-cigarette knowledge, perception and their current clinical practices for patients using E-cigarettes. A knowledge score was computed, and associations between participant demographic characteristics and knowledge survey items, perception survey items and knowledge score levels, and behavior survey items and knowledge score levels were explored.

Results: Most practitioners do not see or do not ask patients about E-cigarette use (33%), switching from conventional cigarette to E-cigarette use (38%) or dual use (55%). Practice behaviors were not significantly different across knowledge score groupings. Low knowledge group consistently had negative practice behavior except more positive response within the group for recommending stopping of E-cigarettes before invasive procedures was observed (mode = 5).

Conclusions: This study reinforces the value of disseminating and translating this evidence to dental practitioners through early inclusion of this topic in dental and hygiene training programs and through continuing education courses.

Keywords: E-cigarettes, Bareilly, Dental Practitioners, Dentistry

Introduction

Electronic cigarettes (E-cigarette) or Electronic Nicotine Delivery Systems (ENDS) have gained considerable attention since their introduction into European and American markets in 2006 and 2007, respectively (Noel, Rees and Connolly, 2011). Practitioners should be concerned because - cigarette users refer themselves as “vapers” and when asked about tobacco use, E-cigarette users may not refer to

their use of E-cigarettes as "smoking" or themselves as "smokers". On May 10, 2016, the US Food and Drug Administration (FDA) finalized a rule extending the agency's authority to regulate E-cigarettes manufacturing, labeling, advertising, sales etc. ("Deeming Tobacco Products to be Subject to the Federal Food, Drug, and Cosmetic Act, as Amended by the Family Smoking Prevention and Tobacco Control Act; Restrictions on the Sale and Distribution of Tobacco Products and Required Warning Statements for Tobacco Products", 2016).

E-cigarettes are used as an entry drug by adolescent children and young adults. CDC and the Food and Drug Administration (FDA) analyzed data from 2011 to 2016 National Youth Tobacco Surveys (NYTS) to identify patterns of current (in the last 30 days) use of seven tobacco product types among US middle and high school students. They concluded that for 2016, 47.2% of high school students and 42.4% of middle school students currently used more than 2 tobacco products, and E-cigarettes were the most commonly used tobacco product among high (11.3%) and middle (4.3%) school students. Researchers have blamed the rapid rise in use of E-cigarettes among young adults on aggressive marketing strategies used by manufacturers. (Yang, et al., 2017) conducted a nationally (US) representative longitudinal phone survey of 13–25 year olds from June 2014 to September 2016, with 2,413 respondents who completed a baseline and follow-up survey six months later. The authors concluded that information seeking predicted higher likelihood of vaping six months later even after controlling for baseline smoking and vaping status, intention to vape, and demographics, The second conclusion was that information seeking partially mediated the relationship between intention to vape and subsequent vaping behavior (Yang, et al., 2017).

It is important for the dental community to be aware of grave threat that E-cigarette pose to our patients' health. Identifying and recognizing E-cigarettes as a risk would be first steps towards creating an action plan in tackling this emerging crisis. Currently, there is limited research evaluating how knowledge and awareness of E-cigarettes influences practice patterns of dentists. Therefore, the primary objective of this study is to assess the knowledge and perceptions of practicing dentists related to E-cigarette smoking risk and how their knowledge and perceptions influence decision making when developing treatment plans.

Materials and Methods

Based on an extensive literature review, we designed a survey to assess the knowledge, perceptions, and practice behavior of dental practitioners in relation to E-cigarettes and oral health. The final 28-items survey was prepared in English and made available to dental practitioners through an online survey system (WhatsApp). Background data for each practitioner were collected, including their title/role (dentist, hygienist, or other), dental specialty (general, periodontics, endodontics, pediatric dentistry, orthodontics, oral/maxillofacial surgery, prosthodontics, or other), and year in which the highest level of dental training was completed (1995 or earlier 1996–2015, 2015–2018). The participants' knowledge, perception and behavior of E-cigarettes were assessed on the basis of their responses to survey questions concerning the risk of E-cigarettes on oral health, use of E-cigarettes as cessation device/therapy and the practitioner's current practices for patients using E-cigarettes. A total of 28 questions (6 demographic-based, 10 knowledge based, 4 perception based and 8 behavior based) were evaluated. Demographic questions could be answered with top-of-the-head estimate about frequency of patient using E-cigarettes

with answers of either None, Rarely (less than 1 per week), Occasionally (1 per week to 1 per day), Often (more than 1 per day), and Don't Know options.

Knowledge, perception and behavior questions could be answered, with either strongly agree/agree/neutral or don't know/disagree/strongly disagree or always/sometimes/rarely/never/doesn't apply. Knowledge score was calculated based upon correct answers to the 10 knowledge-based questions. Correct answers were those deemed most supported by current literature. Knowledge questions for which limited or inconclusive information was available were viewed as correctly answered by the less definitive responses of agree/neutral/disagree. A knowledge score equal to the sum of correct answers was constructed. Participants were classified as having a high knowledge score (8-10 questions answered correctly), medium knowledge score (6-7 questions answered correctly) or a low knowledge score (0-5 questions answered correctly). Strongly agree, agree, always, and sometimes were interpreted as positive survey responses; strongly disagree, disagree, rarely, and never were viewed as negative responses. Contingency tables of knowledge score category versus each survey item response and reported positive or negative responses (in %) were constructed.

Statistical Analysis

Descriptive statistics were used to summarize each of the survey questions, and knowledge score mode, mean, median, and interquartile range was computed. Correlation between completion of training year and encounters with E-cigarette users, completion of training year and knowledge score and Pearson's rho (correlation coefficient) was calculated for overall knowledge score and individual behavior questions**.**

Results

Dental practitioners (n = 187) completed the 28-items survey. The majority of practitioners surveyed were dentists (158) (85%), and 27 (15%) were hygienist. Out of the total respondents (Figure 1), 64% reported being in General Dentistry Practice (General Dentist and Pediatric Dentist), 20% in surgical specialties (Endodontics, Periodontics, and Oral, Maxillo-facial surgery) and 16% in Non-surgical fields (Orthodontics, Prosthodontics and other). Of the 27 hygienist that responded to our survey, 72% were in General Dentistry practice. Most of the respondents (110) (61%) completed their training before 1995, and 69 (39%) completed their highest level of training in 1996-2018 (Figure 2).

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Figure 1: Distribution of Practitioners According to Specialty

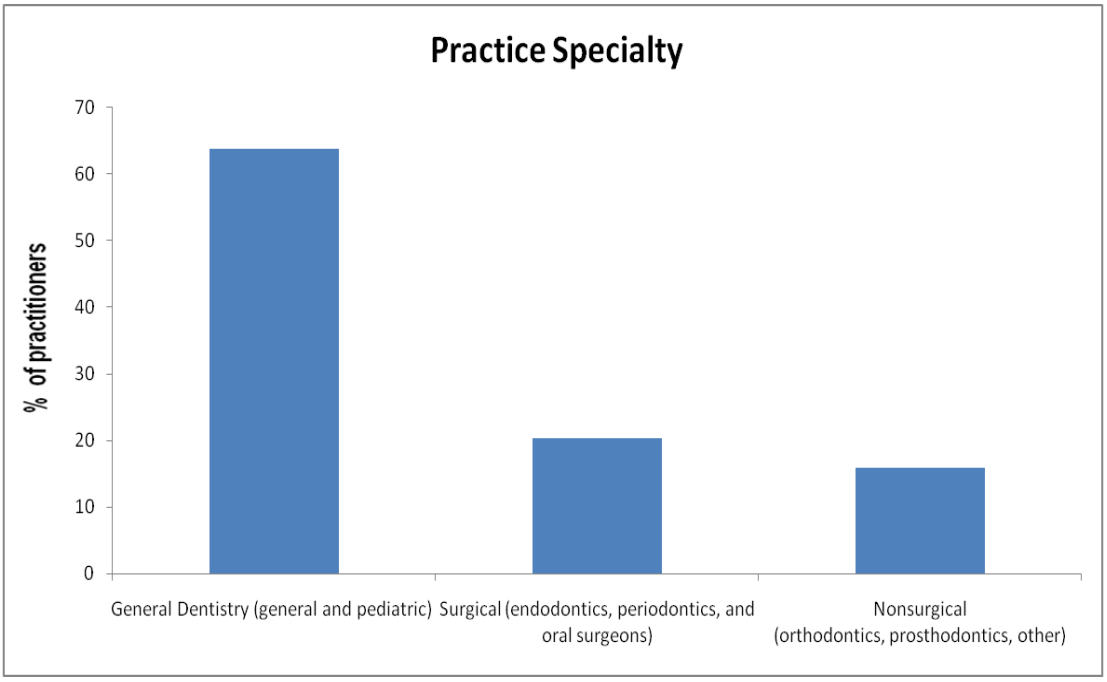


Figure 2: Distribution of Completion of Training Year

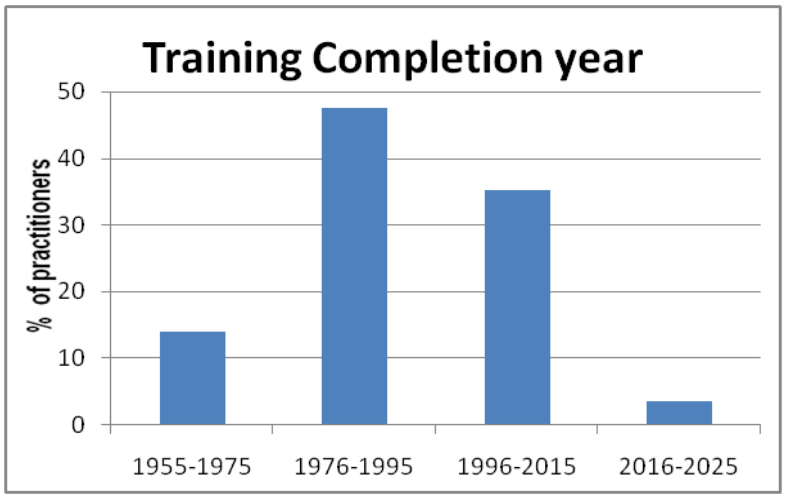
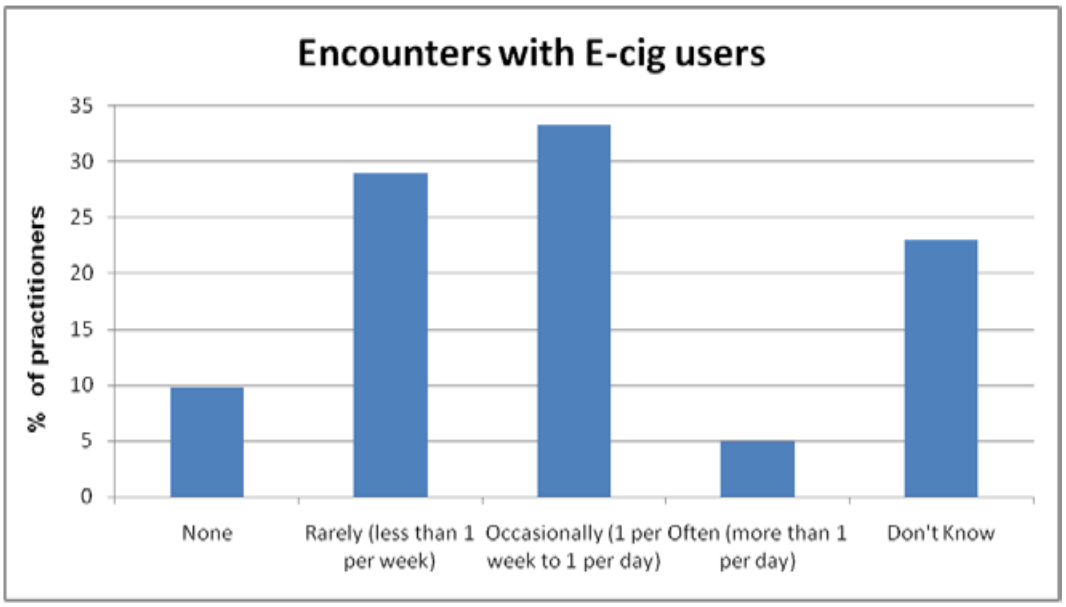
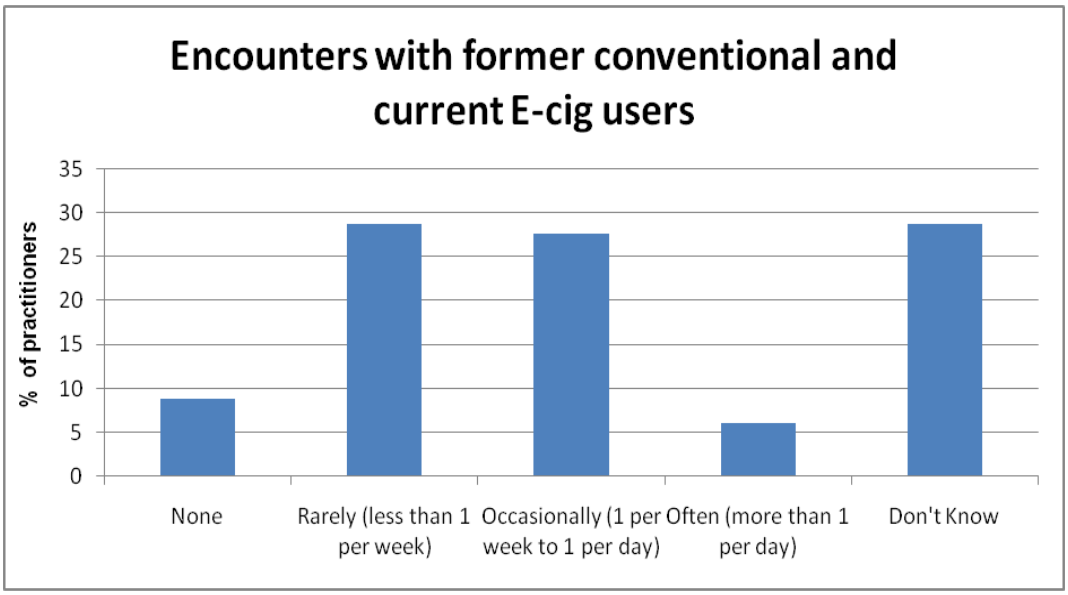


Figure 3: Frequency of Encounters with E-cigarette Users





Overall, 29% of practitioners reported not knowing the frequency with which their patients were e-cigarette users. Comparison of the two categories based on year of completion of training showed significant differences ($p < 0.01$) with the older training group reporting "Don't Know" at an 11% higher frequency than the younger training group (Table 1). Additionally, 31% of all practitioners reported seeing E-cigarette users "occasionally to often" in their practices that is at least on a monthly basis, with no difference between training groups.

Table 1: Frequency of Encounters and Training Completion Year

		Occasionally – Often	Rarely – Never	Don't Know	P Value
0 - Overall E-cigarette Encounters [Sum of 3 Questions Below]	1995 & Earlier	101 (31%)	113 (35%)	109 (34%)	0.004*
	1996-2018	64 (29%)	104 (48%)	49 (23%)	

1 - Encounters with E-cigarette Users	1995 & Earlier	39 (36%)	38 (35%)	31 (29%)	0.521
	1996-2018	30 (41%)	32 (44%)	11 (15%)	
2 - Encounters with Former Conventional and current E-cigarette Users	1995 & Earlier	36 (34%)	36 (34%)	35 (33%)	0.187
	1996-2018	24 (33%)	32 (44%)	17 (23%)	
3 - Encounters with Dual Users	1995 & Earlier	26 (25%)	39 (36%)	43 (39%)	0.025
	1996-2018	10 (16%)	40 (55%)	21 (29%)	

Differences between Training cohorts:

0 - The chi-square statistic is 11.0744. The p-value is .003938. The result is significant at $p < 0.01$.

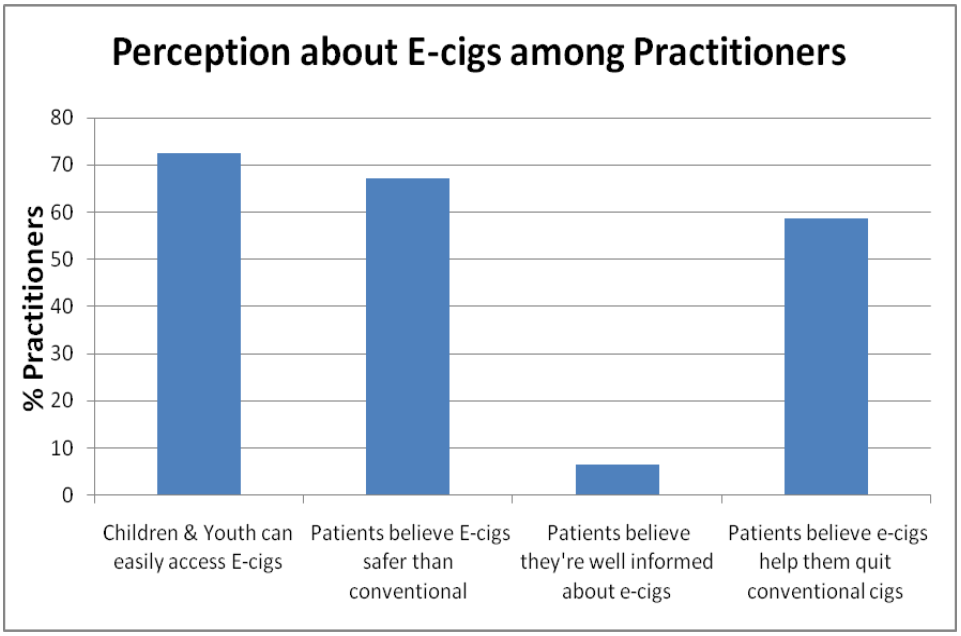
1 - The chi-square statistic is 1.3056. The p-value is .520585. The result is not significant at $p < 0.01$.

2 - The chi-square statistic is 3.3482. The p-value is .187477. The result is not significant at $p < 0.01$.

3 - The chi-square statistic is 7.3524. The p-value is .025319. The result is not significant at $p < 0.01$. $P < 0.01$ significance determined with Bonferroni correction.

We asked about practitioners' perceptions about E-cigarettes and patient attitude towards E-cigarettes (Figure 4). Of the total practitioner that responded, 73% (132 of 182 practitioners) believed that children and youth have easy access to E-cigarettes. The majority of practitioners did feel that E-cigarettes offered some benefit with 67% (122 of 182) reporting that their patients believed that E-cigarettes were safer than conventional cigarettes, 59% (106 of 181) reported that their patients believed that E-cigarette is helping them quit conventional cigarettes, but only 7% (12 of 181) considered their patients to be well informed about the risks and benefits of E-cigarettes.

Figure 4: Perceptions about E-cigarette among Practitioners



We asked respondents 10 questions to assess their knowledge based on published evidence regarding e-cigarettes. When asked about their knowledge about risks of E-cigarettes 53% (96 of 183) of respondents felt that they are well informed. Similar number of practitioners, 53% (97 of 183) correctly

reported that they feel E-cigarettes are not safer than conventional cigarettes. When asked about oral cancer risks, dry mouth/caries risks, periodontal disease risk and risks with dental implant failures, 55% (101 of 183), 79% (143 of 182), 75% (136 of 182), and 78% (142 of 183), respectively, of practitioners reported as being concerned with E-cigarettes. When asked about concerns regarding wound healing with E-cigarette use 74% (135 of 182) practitioners reported that they were concerned. Oral and general health risks is high according to 84% (153 of 183) practitioners in E-cigarette smokers and about 92% (168 of 182) practitioners are worried about the harmful effects of unknown chemicals and constituents in the E-cigarettes. Only 29% responded correctly that E-cigarettes are not beneficial for conventional cigarette smoking cessation.

Table 2: Key to Answers and Observed Responses to "Knowledge Score" Questions

Response Percentage (n)						
Questions	**Correct Answer**	**Strongly Agree**	**Agree**	**Neutral/ Don't Know**	**Disagree**	**Strongly Disagree**
1. I am well informed about the risks of E-cigarettes	Strongly Agree/Agree	15% (27)	38% (69)	22% (40)	21% (38)	5% (9)
		Total	**53%**			
2. In my opinion, E-cigarettes are overall safer than conventional cigarettes	Disagree/ Strongly Disagree	2% (4)	22% (41)	22% (41)	33% (61)	20% (36)
					Total	**53%**
3. E-cigarette use increases the risks for oral cancer	Strongly Agree/Agree	19% (35)	36% (66)	38% (70)	6% (11)	0.5% (1)
		Total	**55%**			
4. E-cigarette use can cause dry mouth and/or increases the risk of caries	Agree/Neutral/ Disagree	21% (39)	49% (89)	28% (51)	1.6% (3)	0 (0)
			Total		**78%**	
5. E-cigarette use increases risk of susceptibility to periodontal disease	Agree/Neutral/ Disagree	25% (46)	44% (80)	29% (52)	2% (4)	0 (0)
			Total		**75%**	
6. E-cigarette use negatively affects oral wound healing	Agree/Neutral/ Disagree	26% (47)	47% (86)	26% (47)	1% (2)	0 (0)
			Total		**74%**	
7. E-cigarette use increases risk of implant failure	Agree/Neutral/ Disagree	22% (41)	37% (68)	40% (73)	0.5% (1)	0 (0)
			Total		**77%**	
8. Oral and general health risks associated with e-cigarette use increases with duration and dose.	Strongly Agree/Agree	26% (48)	57% (105)	16% (30)	0 (0)	0 (0)
		Total	**83%**			
9. I am concerned about the unknown constituents/chemicals in e-cigarettes and their effects on general and oral health	Strongly Agree/Agree	59% (108)	33% (60)	6% (11)	2% (3)	0 (0)
		Total	**92%**			
10. E-cigarettes are helpful to patients who want to quit smoking cigarettes	Disagree/Strongly Disagree	3% (6)	32% (58)	35% (63)	20% (35)	9% (17)
					Total	**29%**

The distribution of survey responses observed for the ten questions contributing to the knowledge score are presented in Table 2. High knowledge group was considered as practitioners those answered 8-10 correct answers, medium knowledge group 6-7 correct answers and low knowledge group as 0-5 correct answers (Figure 8). The overall observed knowledge score range was 0 to 10 [median (IQR, interquartile

range) = 7.0 (2)]. In the high knowledge category 54 practitioners (29%) [median score (IQR) = 8 (7,8)] were classified, while 87 practitioners (47%) were classified into medium knowledge category [median score (IQR) = 7 (6,7)] and 46 practitioners (25%) were classified into the low knowledge category [median score (IQR) = 5 (4,5)] and. 8 of the 10 knowledge questions were answered correctly by only 29% of all the practitioners.

Table 3: Key to Answers and Observed Responses to Behavior Questions

Response Percentage (n)						
Questions	**Correct Answer**	**Always**	**Sometimes**	**Rarely**	**Never**	**Doesn't Apply**
1.Information about the risk from E-cigarettes use is include in my patient consent forms	Always/ Sometimes	4% (7)	3% (6)	17% (30)	76% (138)	0 (0)
2. My medical history forms ask my patients about the use of E-cigarettes	Always	21% (39)			79% (148)	
3. My medical history forms ask my patients about the use of Conventional cigarettes	Always	86% (160)			14% (27)	
4. My medical history forms ask my patients about the use of other nicotine products	Always	12% (23)			88% (164)	
5. I (would) modify my treatment recommendations if a patient reports smoking E-cigarettes	Always/ Sometimes	13% (24) **Total**	44% (81) **57%**	23% (43)	9% (17)	10% (18)
6. If my patients use E-cigarettes, I discuss the risks of adverse effect on oral health	Always/ Sometimes	41% (75) **Total**	28% (52) **69%**	12% (22)	9% (17)	9% (17)
7. If my patients use E-cigarettes, I discuss the risks of adverse outcomes of treatment with him or her	Always/ Sometimes	39% (71) **Total**	25% (45) **64%**	14% (26)	11% (21)	10% (18)
8. I have advised patients who require invasive dental treatment to stop using E-cigarettes before a procedure	Always/ Sometimes	32% (58) **Total**	16% (30) **48%**	10% (19)	19% (35)	22% (40)
9. I have concerns with offering dental implants to patients who use E-cigarettes	Always/ Sometimes	28% (51) **Total**	24% (44) **52%**	11% (19)	7% (13)	29% (53)
10. I worry about healing after extractions and surgical procedures for patients who use E-cigarettes	Always/ Sometimes	49% (89) **Total**	25% (45) **74%**	8% (15)	4% (7)	15% (27)

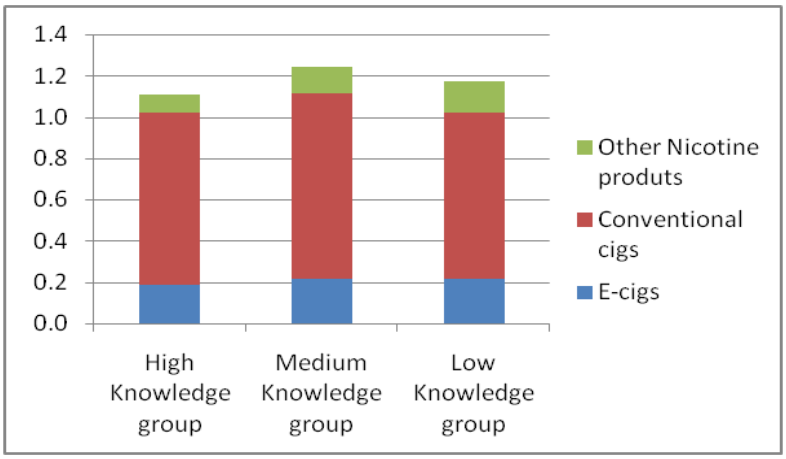
Correlation between Knowledge Level and Individual Behavior Questions

When level of knowledge score was correlated with mean scores for individual behavior questions we did not find any difference between high, medium and low knowledge groups. Most of the behavior questions had correct responses across all knowledge levels. 93% (168) and 79% (148) practitioners irrespective of their knowledge level did not include E-cigarettes in their informed consent or medical forms, respectively.

Low knowledge level practitioners consistently were less likely to modify treatment options, recommend stopping E-cigarette before invasive procedures, discuss risks of E-cigarettes on oral and general health, and discuss risk with treatment outcomes and healing post extraction or surgeries. Concerns about

offering dental implants to E-cigarette smokers was the only category in which high knowledge group demonstrated less concern than low knowledge group practitioners.

Figure 10: Correlation of Medical History to Knowledge Score



When looking closely within the low, medium and high knowledge group's responses to individual behavior questions we found that for Low knowledge group practitioners responded more commonly (mode = 5) against recommending stopping E-cigarette before invasive procedure compared to medium and high knowledge groups. The high knowledge group responded more commonly (mode = 5) indicating no concern with recommending dental implants for E-cigarette users compared to medium and low knowledge groups. For all other behavior questions the common responses across low, medium and high knowledge groups were the same. This shows that knowledge level is a subtle predictor for practice behavior regarding E-cigarettes.

Discussion

The results from this study show that overall practitioner knowledge of E-cigarette risk does not influence practice behaviors among those surveyed. This may be due to lack of data specifically regarding E-cigarettes risk and oral health. The prevalence of patients reporting E-cigarette use within the patient population of our surveyed practitioners is high in accordance with other national level data reported by Merianos, et al.[13] (2017), CDC & FDA 2011-2016 National Youth Tobacco Surveys (NYTS). In a National Youth Tobacco survey, Merianos, et al. found that from 2013-2015, youth were at nearly 5 times the risk of reporting ever use of E-cigarettes and 4 times the risk of reporting current use compared to 2013 (Merianos, et al., 2017)[13]. This is concerning given research suggests that E-cigarette use may be predictive of initiation of conventional cigarette use due to low perceived harm and the potential of renormalization and social acceptance of smoking behavior among this population (Barrington-Trimis, et al.[14], 2015; Zhong, et al.[15], 2016; Leventhal, et al.[16], 2015). As seen by our survey, 38% practitioners see E-cigarette users more than once per day to one per week in their practices. 34% practitioners are noting increase in switch to E-cigarette and 20% see dual use among their patients consistent with other reports of poly product use. Merianos, et al. found that exposure to vapor from E-cigarettes in public places significantly increased the risk of dual and poly use. Patients exposed to E-cigarette were 10.4 times (95% CI, 7.8-13.8) more likely to report current poly use (Merianos, et al., 2017)[13]. In 2014, a study of adolescents and young adults found that among active tobacco users, 25%

reported using at least 2 tobacco products, and 21% reported using more than 2 tobacco products (S. Soneji, 2018)[17].

Our results suggest that a third of surveyed practitioners do not know or did not collect information from their patients about E-cigarette use. Also a third of practitioners surveyed who completed their training year 1995 or earlier did not know or did not collect information from their patients about E-cigarette use. Similarly, 38% and 55% of practitioners did not know or did not collect information from their patients about former conventional cigarette and current E-cigarette use or dual use, respectively. 33% and 39% of practitioners graduating 1995 or earlier did not know or did not collect data regarding former conventional cigarette and current E-cigarette or dual use, respectively. Statistically significant difference between training groups could be explained by the emergence of new evidence linking risks in overall health and conventional smoking and the incorporation of this body of literature into medical and dental training programs. This practitioner behavior can be explained by a lack of knowledge and evidence regarding E-cigarettes and oral health. This can also be explained by the neighborhood or part of state they practice where patients might not use E-cigarette and use other tobacco products. This phenomenon was observed by (Hartwell, et al., 2016)[18] that concluded that certain socio-demographic characteristics such as younger age, male sex, higher educational attainment appear to be patterned with E-cigarette awareness, 'ever use' and current use. Although significant downward trends in conventional cigarette smoking have been seen among high school students, there have been upward trends in the use of non-conventional tobacco and nicotine delivery products such as hookah and E-cigarettes; resulting in no overall change in nicotine product use over time (Kann, et al., 2016)[19].

Access to E-cigarettes has been reported by many studies as unregulated and marketing strategies are targeting young vulnerable population. Several studies elude to the fact that exposure to E-cigarette advertising and lower harm perception is associated with a higher likelihood of use (Choi and Forster, 2014)[20]. In 2013-2014, 81% of current youth E-cigarette users cited the availability of appealing flavors as the primary reason for use (Villanti, et al., 2017)[21].

Knowledge score distribution among the surveyed practitioners categorized more than 2/3rd of the respondents into medium to high knowledge level groups. Given the paucity of data regarding effects of E-cigarettes on oral/dental health, it seems that the dental community is drawing parallels in knowledge with conventional cigarettes and newer tobacco products. As a major branch of healthcare we are better off expecting similar harm profile for E-cigarettes as the conventional tobacco cigarette. This strategy would prepare us to protect our patients and our practices as we learn more from upcoming evidence suggesting the worse.

Curriculum in dental and hygiene program lacks information about recommending smoking cessation therapies and working closely with physician and other allied providers. E-cigarettes have been in the market for more than a decade but information and risks about them progresses slowly into academic books and training programs.

Clinical Implications

This study did identify differences in certain practice behaviors based on subject knowledge and demonstrates a need for translation of information into clinical practice guiding dental care for patients smoking E-cigarettes. This study also urges professional dental organizations e.g. American Dental Association, American Academy of Periodontology and others to review the evidence and provide guidelines and best practices for its members to effectively manage patients using E-cigarettes.

References

1. C. Andrew Aligne, Mark E. Moss, Peggy Auinger, Michael Weitzman, "Association of Pediatric Dental Caries with Passive Smoking", JAMA, 2003, 289(10), 1258–1264.
2. Benjamin J. Apelberg, Catherine G. Corey, Allison C. Hoffman, Megan J. Schroeder, Corinne G. Husten, Ralph S. Caraballo, Cathy L. Backinger, "Symptoms of Tobacco Dependence among Middle and High School Tobacco Users: Results from the 2012 National Youth Tobacco Survey", American Journal of Preventive Medicine, 2014, 47(2(Suppl 1)), S4-S14.
3. John W. Ayers, Benjamin M. Althouse, Jon-Patrick Allem, Eric C. Leas, Mark Dredze, Rebecca S. Williams, "Revisiting the Rise of Electronic Nicotine Delivery Systems Using Search Query Surveillance", American Journal of Preventive Medicine, 2016, 50(6), e173–e181.
4. Chadi Azzi, Jin Zhang, Carryn H. Purdon, James M. Chapman, Daniela Nitcheva, James R. Hebert, Eric W. Smith, "Permeation and Reservoir Formation of 4-(Methylnitrosamino)-1-(3-Pyridyl)-1-Butanone (NNK) and Benzo[a]Pyrene (B[a]P) across Porcine Esophageal Tissue in the Presence of Ethanol and Menthol", Carcinogenesis, 2006, 27(1), 137–145.
5. C.A. Bain, P.K. Moy, "The Association between the Failure of Dental Implants and Cigarette Smoking", The International Journal of Oral & Maxillofacial Implants, 1993, 8(6), 609–615.
6. Jessica L. Barrington-Trimis, Kiros Berhane, Jennifer B. Unger, Tess Boley Cruz, Jimi Huh, Adam M. Leventhal, Robert Urman, et al., "Psychosocial Factors Associated With Adolescent Electronic Cigarette and Cigarette Use", Pediatrics, 2015, 136(2), 308–317.
7. Kanae Bekki, Shigehisa Uchiyama, Kazushi Ohta, Yohei Inaba, Hideki Nakagome, Naoki Kunugita, "Carbonyl Compounds Generated from Electronic Cigarettes", International Journal of Environmental Research and Public Health, 2014, 11(11), 11192–11200.
8. Jennifer M. Bombard, Linda L. Pederson, John J. Koval, Michelle O'Hegarty, "How Are Lifetime Polytobacco Users Different than Current Cigarette-Only Users? Results from a Canadian Young Adult Population", Addictive Behaviors, 2009, 34(12), 1069–1072.
9. M. Bouza, J. Gonzalez-Soto, R. Pereiro, J.C. de Vicente, A. Sanz-Medel, "Exhaled Breath and Oral Cavity VOCs as Potential Biomarkers in Oral Cancer Patients", Journal of Breath Research, 2017, 11(1), 016015.
10. J.A. Brooks-Brunn, "Esophageal Cancer: An Overview", Medsurg Nursing: Official Journal of the Academy of Medical-Surgical Nurses, 2000, 9(5), 248–254.
11. Rebecca E. Bunnell, Israel T. Agaku, René A. Arrazola, Benjamin J. Apelberg, Ralph S. Caraballo, Catherine G. Corey, Blair N. Coleman, Shanta R. Dube, Brian A. King, "Intentions to Smoke Cigarettes among Never-Smoking US Middle and High School Electronic Cigarette Users: National Youth Tobacco Survey, 2011-2013", Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco, 2015, 17(2), 228–35.

12. Patricia A. Cavazos-Rehg, Melissa J. Krauss, Edward L. Spitznagel, Richard A. Grucza, Laura Jean Bierut, "Youth Tobacco Use Type and Associations with Substance Use Disorders", Addiction (Abingdon, England), 2014, 109(8), 1371–1380.
13. Ashley L. Merianos, Tierney F. Mancuso, Judith S. Gordon, Kelsi J. Wood, Katherine A. Cimperman, E. Melinda Mahabee-Gittens, "Dual- and Polytobacco/Nicotine Product Use Trends in a National Sample of High School Students", American Journal of Health Promotion: AJHP, January 2017, 890117117743361.
14. Jessica L. Barrington-Trimis, Kiros Berhane, Jennifer B. Unger, Tess Boley Cruz, Jimi Huh, Adam M. Leventhal, Robert Urman, et al., "Psychosocial Factors Associated With Adolescent Electronic Cigarette and Cigarette Use", Pediatrics, 2015, 136(2), 308–317. https://doi.org/10.1542/peds.2015-0639
15. Jieming Zhong, Shuangshuang Cao, Weiwei Gong, Fangrong Fei, Meng Wang, "Electronic Cigarettes Use and Intention to Cigarette Smoking among Never-Smoking Adolescents and Young Adults: A Meta-Analysis", International Journal of Environmental Research and Public Health, 2016, 13(5).
16. Adam M. Leventhal, David R. Strong, Matthew G. Kirkpatrick, Jennifer B. Unger, Steve Sussman, Nathaniel R. Riggs, Matthew D. Stone, Rubin Khoddam, Jonathan M. Samet, Janet Audrain-McGovern, "Association of Electronic Cigarette Use With Initiation of Combustible Tobacco Product Smoking in Early Adolescence", JAMA, 2015, 314(7), 700–707.
17. Samir S. Soneji, Hai-Yen Sung, Brian A. Primack, John P. Pierce, James D. Sargent, "Quantifying Population-Level Health Benefits and Harms of e-Cigarette Use in the United States", PLOS One, 2018, 13(3), e0193328. https://doi.org/10.1371/journal.pone.0193328
18. Greg Hartwell, Sian Thomas, Matt Egan, Anna Gilmore, Mark Petticrew, "E-Cigarettes and Equity: A Systematic Review of Differences in Awareness and Use between Sociodemographic Groups", Tobacco Control, December 2016.
19. Laura Kann, Tim McManus, William A. Harris, Shari L. Shanklin, Katherine H. Flint, Joseph Hawkins, Barbara Queen, et al., "Youth Risk Behavior Surveillance - United States, 2015", MMWR Surveillance Summaries, 2016, 65(6).
20. Kelvin Choi, Jean L. Forster, "Beliefs and Experimentation with Electronic Cigarettes: A Prospective Analysis among Young Adults", American Journal of Preventive Medicine, 2014, 46(2), 175–178.
21. Andrea C. Villanti, Amanda L. Johnson, Bridget K. Ambrose, K. Michael Cummings, Cassandra A. Stanton, Shyanika W. Rose, Shari P. Feirman, et al., "Flavored Tobacco Product Use in Youth and Adults: Findings From the First Wave of the PATH Study (2013-2014)", American Journal of Preventive Medicine, 2017, 53(2), 139–151. https://doi.org/10.1016/j.amepre.2017.01.026