



American
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- COVID-19: Tasked to Respond
- Oral Health Professionals Knowledge, Attitudes and Practices Toward Patients with Depression
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The Journal of Dental Hygiene is the refereed, scientific publication of the American Dental Hygienists' Association. The JDH promotes the publication of original research related to the profession, education, and practice of dental hygiene and supports the development and dissemination of a dental hygiene body of knowledge through scientific inquiry in basic, applied and clinical research.

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Inside this Issue

Guest Editorial

- 4** **COVID-19: Tasked to Respond**
JoAnn R. Gurenlian, RDH, MS, PhD, AFAAOM; Kathy Eklund, RDH, MHP

Research

- 6** **Oral Health Professionals Knowledge, Attitudes and Practices Toward Patients with Depression**
Emily E. McCleary, MSDH, RDH; Lori Rainchuso, DHSc, MS, RDH; Jared Vineyard, PhD, Lori Giblin-Scanlon, DHS, RDH
- 14** **Hispanic Seasonal Farmworker Caregivers' Beliefs and Perceptions of Early Childhood Caries**
Yesenia Rivera, RDH, MSDH; Linda D. Boyd, RDH, RD; Lory Libby, RDH, MSDH
- 22** **Direct Access Dental Hygienists' Perceptions Concerning Geriatric Curriculum in Entry-Level Dental Hygiene Programs.**
Lesley A. Harbison, RDH, EPDH, MS; JoAnn R. Gurenlian, RDH, MS, PhD, AFAAOM; Jacqueline Freudenthal, RDH, MHE; Dani Moffit, PhD, LAT, ATC
- 30** **Characterization of Tasks and Time Efficiency of Dental Hygiene Students During Clinical Training**
Yiyang Fang, MA; Kryztopher D. Tung, PhD; Joan Beleno-Sanchez, RDH, MHS; Jane L. Forrest, RDH, EdD; Shawn C. Roll, PhD, OTR/L, RMSKS, FAOTA, FAIUM
- 38** **Preventive Dental Care Programs for Children: Parental perceptions and participation barriers**
Kim Attanasi, PhD, MS, RDH; Vasilieos Margaritis, PhD, MSc, DDS; Scott McDoniel, PhD, FACN, FTOS

Innovations in Dental Hygiene Education

- 44** **Online Dental Hygiene Degree Completion Program: Outcomes of a longitudinal study**
Jennifer L. Cullen, RDH, MPH; Mary Grace Ash, RDH, MA; Anne E. Gwozdek, RDH, MA
- 52** **2020 ADHA Virtual Conference Poster Presentation Abstracts**

COVID-19: Tasked to Respond



JoAnn R. Gurenlian,
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Kathy Eklund,
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By now, as you read this editorial, we are at least ten months into a pandemic and no closer to understanding the virology of COVID-19. This virus does not play nice; it does not behave like other viruses that we understand (herpes simplex, shingles, HIV, Epstein Barr, etc.). Rather, it remains a conundrum that seems to change almost on a weekly basis causing infectious disease specialists, scientists, and health care workers to grapple with how to best manage the virus itself and those patients infected with it. We have yet to come to terms with how to address the aftereffects of this illness – a story that will continue to unfold before our eyes. As educators and practitioners, as people experiencing COVID-19, we are going to be forever changed by something we could not imagine possible a year ago.

In April of this year, the American Dental Hygienists' Association (ADHA) recognized that action was needed to create a framework for dental hygienists planning to return to work. Matt Crespino, then President of the Association, formed a Task Force (TF) to develop guidance on returning to work, utilizing experts in the areas of dental hygiene education, clinical practice, public health, infection control, teledentistry, and pathology and oral medicine. The team was comprised of the following individuals.

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The TF was charged with reviewing current ADHA policy and recommending changes needed, reviewing key resources and creating the guidance document - and completed these tasks over the course of one week! The TF reviewed the [ADHA Standards for Clinical Dental Hygiene Practice](#) and [ADHA Code of Ethics](#) as well as key resources from the Centers for Disease Control and Prevention (CDC), the Occupational Safety and Health Administration (OSHA), the American Dental Association (ADA) and the Organization for Safety, Asepsis and Prevention (OSAP). Thanks to a yeoman's effort by the TF, Ann Battrell, ADHA Chief Executive Officer, Ann Lynch, ADHA Director of Advocacy and Education, and key staff at ADHA, the [ADHA Interim Guidance on Returning to Work](#) launched eight days after the TF began meeting and was in such high demand that the website crashed when the document was initially posted!

The Interim Guidance document supports the recommendations from the CDC, and strives to balance the need to provide necessary oral health services while minimizing risk to patients, oral health professionals and staff members. Major topics addressed within the document include: Prior to Opening, Work Environment, Patient Preparation, Special Considerations for Providing Dental Hygiene Care, Personal Protective Equipment, and Disinfection. A COVID-19 Patient Screening Questionnaire and Dental Hygiene Readiness to Return to Work Form are also offered as supplemental documents.

One point, that is most interesting from a research perspective, is that this novel virus keeps changing. The evolving nature of SARS CoV-2 provides an opportunity for us to keep

learning and adapting. As a result, the Interim Guidance is a living document that must change as well. When new evidence becomes available through scientific publications and updates to the [CDC Interim Infection Prevention and Control Guidance for Dental Settings During the Coronavirus Disease 2019 \(COVID-19\) Pandemic](#), the TF reviews this information and updates the ADHA Interim Guidance on Returning to Work accordingly. ADHA has remained responsive to its constituents by providing a [COVID-19 resource site](#), a [Task Force site](#) and a dedicated email for questions (rdhcovidinfo@adha.net). The TF and ADHA staff remain involved by regularly responding to questions regarding COVID-19 and hosting webinars to support practitioners' and educators' learning about this important and evolving topic.

Dental hygienists are inclined to want to have all the answers, to be well-organized, to have everything planned to a "T" and for things to be neat and tidy. Coronavirus is just not fitting very well into those best-made plans. We don't have all the answers and the answers keep changing, so it is hard to plan. We have to function differently, and our "normal" is gone. The TF and ADHA staff continually hear feedback that dental hygienists are frustrated because they do not always like the guidance recommendations. They want to use their ultrasonic devices and air polishers. They are tired of worrying about aerosols. And, they may not be able to acquire all the recommended personal protective equipment (PPE) or the technologies to improve air quality or be able to reduce aerosol and spatter contamination.

SARS CoV-2 challenges us to remain vigilant and flexible in our professional efforts to prevent healthcare associated infections (HAIs). There are so many variations of the Interim Guidance document, it is really quite interesting to witness. Professional state associations, state boards of dentistry, licensing groups, speakers, educators, all have offered their own versions watering down national guidance to fit their own convenience. The comment made often is that national guidance recommendations are not mandates; therefore, they do not need to be followed. One can use their own professional judgement and make their own decisions. This reasoning works well until a someone contracts COVID-19 from a practicing dental hygienist or dentist who is not

following national guidance and a lawsuit ensues. Potential loss of one's license and insurance coverage should not be the incentive to follow national recommendations. Standards exist for a reason. Unfortunately, even a pandemic that has killed hundreds of thousands and has made millions seriously ill, may not be enough to inspire professional behavior.

This SARS-CoV-2 virus continues to challenge health care providers, and there is still much to be learned about how to prevent and control its spread. Commitment to a basic premise in healthcare, "First Do No Harm," should be at the forefront of clinical decisions to promote patient and personnel safety during this COVID-19 pandemic and thereafter.

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Oral Health Professionals Knowledge, Attitudes and Practices Toward Patients with Depression

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Abstract

Purpose: Depression is a rising global health concern manifesting bidirectional relationships between chronic disease conditions such as type 2 diabetes and oral health. The purpose of this study was to explore the knowledge, attitudes, and practices of oral health care professionals towards individuals with depression.

Methods: A 24-item, validated Knowledge Attitudes and Practices (KAP) survey was used for this descriptive, cross-sectional study. Non-probability, convenience and snowball sampling was used to recruit oral health care professionals (dentists, dental hygienists and dental assistants) to participate in an electronic survey. Descriptive statistics were used to analyze the data.

Results: A total of 288 oral health care professionals (n=288) met the inclusion criteria. Age of the provider was positively correlated with reviewing or assisting in reviewing patient's depression history during routine dental visits ($r=.16, p=.007$), and referring or assisting in referring a patient to a mental health specialist ($r=.30, p<.001$). Number of years of practice was positively associated with referring or assisting in the referral of a patient to a mental health specialist ($r=.29, p=.001$). Oral health care professionals who indicated having had mental health during their education were more likely to indicate reviewing a history of depression with the patient ($\rho=.17, p=.004$).

Conclusion: Age, lack of practice experience and education may influence oral health care professionals' attitudes and practices when providing care for patients with depression. Mental health and its relationship to oral and systemic health may be an appropriate addition to dental program curricula. Oral health care providers should consider modifying routine practices to include the special needs of patients with depression.

Keywords: depression, depressive disorders, oral health care professionals, oral health promotion, oral systemic disease

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Introduction

Depression is a rising global health concern characterized by decreased energy, sadness, feelings of guilt, low self-esteem, insomnia, chronic fatigue, and thoughts of death or suicide.¹⁻⁴ Signs and symptoms of depression exist on a continuum, with variations in the length and severity of depressive episodes.¹⁻⁴ The persistence of at least five of the diagnostic symptoms for a period of two weeks or more is considered an episode of major depressive disorder; the most common form of depression.⁵ In 2017, data from the Anxiety and Depression Association of America indicated that 7.1% of Americans reported having had at least one major depressive episode within the past year.⁶ While this statistic may seem relatively low, the rate of suicide has increased by 33% over the last two

decades.⁷ The sharp increase in cases of depression, as well as, the associated systemic and oral health outcomes, underscores the need for quality medical and oral health care for at-risk individuals. However, research has shown that patients with depression and other mental illnesses may not receive this comprehensive care due to healthcare professionals' stigmatized views of mental health conditions.⁸⁻¹⁰ For the purposes of this review, the term "stigma" refers to prejudicial attitudes and discriminatory behaviors expressed toward people with depression.⁹

Substantial evidence has confirmed strong, sometimes bidirectional, relationships between depression and chronic

systemic conditions known to have a strong association with periodontal diseases including type 2 diabetes, cardiovascular disease, autoimmune diseases, and other inflammatory disease conditions.^{11,12} Compounding this issue, research shows people with depression are less likely to maintain routine medical and dental care, which may, in turn, worsen and exacerbate these chronic diseases.^{1,13} While limited research has been reported in the literature focusing on the connections between depression and oral health status, emerging evidence has demonstrated the two are closely linked through changes in oral hygiene behaviors, immune response, increased inflammation, and decreased use of oral health care services.^{13,14} Consequently, this population is at an increased risk for dental caries, periodontal disease and tooth loss.¹³⁻¹⁵

Although various factors have been identified as potential barriers to health and dental care, stigmatization remains a prominent barrier to treatment and recovery for individuals with mental illness.^{9,17} Perceived and experienced stigmas may cause patients to be less likely to pursue treatment, while stigmatized viewpoints may influence decision-making and treatment outcomes.^{8,10} Some studies indicate that health care providers endorse the stigmatization of mental illness in a variety of settings.^{10,18,19} However, there is a gap in the literature regarding the perspectives of oral health care professionals towards individuals with depression. The sharp increase of depression across the United States (US) highlights the need for more research in dentistry in order to identify barriers to quality care and provide insight for future education and practice modifications. The purpose of this study was to explore oral health professionals' knowledge, attitudes, and practices toward patients with depression and evaluate the predictive relationship between variables.

Methods

A quantitative, cross-sectional study was developed using descriptive theory to identify characteristics of oral health care providers regarding depression and identify any relationships between these factors and the provision of oral health care. A knowledge, attitudes, and practices (KAP) survey model was selected to answer the research question, minimize bias, and maintain anonymity. The KAP assessment tool is designed to help reveal misconceptions or misunderstandings that may serve as potential barriers to a particular activity or behavior change.²⁰

Survey instrument

The 24-item survey instrument was divided into the following sections: knowledge (6 items), attitude (4 items), practice-based (6 items), and demographics (8 items). The "attitudes" section of the survey used a modified version of

the validated Depression Stigma Scale (DSS), designed to measure personal and perceived stigma toward depression.²¹ The original version of the DSS scale consisted of 18 questions; "personal stigma" (9 items) and "perceived stigma" (9 items).²¹ Personal stigma was defined on the DSS as an individual's own attitudes toward depression, while perceived stigma referred to an individual's belief about what others think regarding depression.²¹ Since the aim of this study was to measure the attitudes of oral health care providers toward depression, only questions from the "personal stigma" portion of the questionnaire were considered. The following items were selected based on relevance to this study: 1) People with depression could snap out of it if they wanted, 2) Depression is a sign of personal weakness, 3) People with depression are dangerous, and 4) If I had depression I wouldn't tell anyone. The item "People with depression are dangerous" was modified to read "People with depression have a tendency to be lazy."

Items related to "knowledge" and "practices" were investigator developed and based on the most current research about depression. The modified KAP survey underwent content validity testing by four experts in the related mental and oral health fields, using a 4-point content validity index (CVI). Panel members included a mental/oral health researcher, oral health researcher, and two licensed mental health therapists. Based on the content validity index score (I-CVI = 1), no modifications were necessary.

Sample selection

The study used non-probability, convenience and snowball sampling methods. These methods were chosen to help increase the number of participants and gather responses from oral health professionals across the US. Oral health providers (dentists, dental hygienists, dental assistants, or dental specialists) who were fluent in English, actively practicing in the US, and over the age of 18 were eligible to participate. Non-English speaking oral health professionals, not currently practicing in the US or not currently licensed, were excluded from the sample. In accordance with 45 CFR 46.101(B)(2), this study was assigned "exempt" status by the MCPHS University Institutional Review Board, IRB071618R.

Participants were recruited through online public Facebook forums, state oral health coalitions, dental hygiene and dental assisting state associations. In addition, administrators of the Iowa Dental Assistants' Association, Massachusetts Dental Hygienists' Association, West Virginia Oral Health Coalition, Pennsylvania Coalition for Oral Health, Washington State Oral Health Coalition, Indiana Oral Health Coalition, and the Kentucky Oral Health Coalition also agreed to forward

the survey link via email to members of their organizations. Recruitment emails were sent directly by organization administrators and then forwarded to members via a mass email, to maintain privacy. Participants were encouraged to share the link with other oral health professionals who may qualify and be willing to participate in the study. The electronic survey remained open for a total of 35 days, and all Facebook posts were refreshed in week 3. Consent to participate was implied when the participant began the survey.

Statistical analysis

Descriptive statistics were used to analyze the data. Subscales for Likert scale responses were calculated by averaging item scores for each subscale to create a single score. Missing data responses were analyzed, and responses were weighted when necessary to adjust for data missing at random. Associations between all variables were examined using Spearman and Pearson correlations where appropriate and chi-square tests of independence. A test of internal reliability assessed the interrelationships of items for each subscale using Cronbach's alpha.²² Regression was used to determine the predictive relationship between predictor and outcome variables. Depending on assumptions of normality, linear, logistic, ordinal, or multinomial regression was used. All statistical hypothesis testing for this study used an alpha level of .05 and reported 95% confidence intervals (95%CI) and all other effect size statistics where appropriate.

A priori power analysis for this study was conducted using G*Power. Using 80% power, with a medium effect size ($f^2=.15$), and $\alpha=.05$, as parameters, the target sample size for regression testing was 77. All analyses were conducted using the Statistical Package for the Social Sciences, SPSS 23 (IBM, Armonk, NY).

Results

A total of 318 oral health care professionals completed the survey (n=318). Following data analysis 15 respondents were removed for missing more than 80% of questionnaire responses, 13 were removed for not meeting the inclusion criteria, and 2 were removed due to incomplete demographic information, leaving 288 respondents in the final sample (n=288). The vast majority of the sample were females (91%, n=261) with a mean age of 42.1 years (SD=13.7), and had been in practice an average of 17.3 years (SD=13.9). Demographic information is shown in Table I.

Separate analyses were conducted to describe the knowledge, attitude, and practice of the respondents. Knowledge was determined by creating a "knowledge score" with the number and percentage of correct responses out of six items. Overall,

Table I. Demographic information (n=288)

	Mean	SD*
Age (n=288)	42.1	13.7
Years in practice	17.3	13.9
	Frequency**	%
Gender		
Male	25	8.7
Female	261	90.6
Prefer not to answer	2	.7
Education (n=282)		
High school diploma	8	2.8
Associate degree	106	14.2
Bachelor's degree	94	12.1
Master's degree	40	37.6
Doctorate	34	32.6
Oral health care profession (n=297)		
Dentist	32	11.3
Dental hygienist	212	75.2
Dental assistant	36	12.8
Specialty dentist	2	0.7
Mental health education (n=286)		
Yes	135	47.2
No	151	52.9

*SD=standard deviation of the mean, 95%CI M=95% confidence interval of the mean.

** %=frequency/n*100, 95%CI=95% confidence interval of proportions.

respondents answered 56% of the knowledge questions correctly. However, the majority of the participants (96% n=277) overestimated the number of people suffering from depression in the US. The mean correct responses broken down by profession are shown in Table II. Responses to the individual knowledge questions are displayed in Table II.

The number of years in practice was negatively correlated ($\rho=-.34$, $p<.001$) with having mental health education included during the respondent's professional education. Respondents who indicated having had an education that included curricular content in mental health were more likely to indicate that they review a patient's history of depression ($\rho=.17$, $p=.004$). Interest in attending continuing education programs to learn more about depression was not significantly correlated with any other variable ($p>.05$). The knowledge score was not significantly correlated with any other variable in the study ($p>.05$).

Table II. Correct responses for each knowledge question (n=286).

		Count	%*	95% Lower CL	95% Upper CL
Approximately what percentage of people in the US are estimated to have depression?	Incorrect	277	96.2%	93.5%	98.0%
	Correct	11	3.8%	2.0%	6.5%
Which of the following medical conditions is linked with a higher rate of depression?	Incorrect	115	39.9%	34.4%	45.7%
	Correct	173	60.1%	54.3%	65.6%
Which of the following is NOT associated with depression	Incorrect	27	9.4%	6.4%	13.1%
	Correct	261	90.6%	86.9%	93.6%
Healthcare providers' personal views toward mental illness have no effect on treatment recommendations or treatment outcomes	Incorrect	75	26.0%	21.2%	31.3%
	Correct	213	74.0%	68.7%	78.8%
Which of the following statements is FALSE regarding patients with depression?	Incorrect	261	90.6%	86.9%	93.6%
	Correct	27	9.4%	6.4%	13.1%
Stress associated with depression increases the risk for periodontal disease.	Incorrect	13	4.5%	2.6%	7.4%
	Correct	273	95.5%	92.6%	97.4%

* %=frequency/n*100, 95%CI=95% confidence interval of proportions.

Attitude questions had fair internal reliability with a Cronbach's alpha of .61 and were combined by averaging the four questions into a new variable "attitude". The mean attitude score by profession is shown in Table IV. Respondents who had been practicing longer and are older had a more positive attitude toward patients with depression (years of practice, $\rho=.19$, $p=.002$; age, $\rho=.17$, $p=.004$). Attitude was separated into individual questions to determine which specific questions were correlated to other variables. Agreement with the statement "People with depression have a tendency to be lazy" was negatively correlated with age ($\rho=-.28$, $p<.001$), and years of practice ($\rho=-.29$, $p<.001$); indicating that older professionals in practice longer tended to disagree with this statement.

Items regarding practices related to patients with depression were evaluated separately and are reported with the mean knowledge and attitude scores by profession in Table IV. Age was positively correlated with performance of reviewing or assisting in reviewing a patient's depression history during routine dental visits ($r=.16$, $p=.007$), as well as, referring or assisting in the referral of a patient to a mental health specialist ($r=.30$, $p<.001$). The number of years of practice was also positively associated with referring or assisting in the referral of a patient to a mental health specialist ($r=.29$, $p=.001$).

To examine the predictive relationship of the attitude and practice items, four separate logistic regression models were created. Each practice question (yes=1, no=0) was regressed onto attitude questions. Of the four different models, only the attitude statement "If I had depression I would not tell anyone" was inversely related to whether a respondent indicated that they had reviewed or assisted in reviewing a patient's depression history ($\chi^2(1, 272)=4.46$, $p=.04$). The result showed that a one-unit increase in agreement with the statement meant a person was 24% less likely to agree they review or assist in reviewing a patient's depression history ($\beta=-.76$, $p<.001$).

Two one-way ANOVAs were conducted to compare mean differences in attitude and knowledge scores between the oral health care professions. Mean differences in attitude scores were significantly different ($F(2, 271)=3.61$, $p=.03$, $h_p^2=.03$) with pairwise comparisons showing dentists had significantly more positive attitudes than dental assistants ($p=.02$, $d=.54$), and dental hygienists had more positive attitudes than dental assistants ($p=.01$, $d=.43$). There were no differences in attitude found between dentists and dental hygienists ($p=.46$). There were statistically significant differences in mean knowledge scores between the professions ($F(1, 271)=3.03$, $p=.05$, $h_p^2=.02$). Dental hygienists had a higher average knowledge score compared to dental assistants ($p=.01$, $d=.57$), but there was no difference between dentists and dental hygienists ($p=.74$).

Two one-way ANOVAs were conducted to compare mean differences in attitude and knowledge score between education levels. There were statistically significant differences in attitude between education levels ($F(1, 272)=3.66$, $p=.01$, $h_p^2=.04$), but not knowledge scores ($F<1$). Respondents with doctoral degrees had more positive mean attitude scores than those with bachelor ($p=.01$, $d=.48$) and associate degrees ($p=.02$, $d=.48$). Respondents with a master's degree also had more positive mean attitude scores than those with a bachelor ($p=.02$, $d=.44$) and associate ($p=.04$, $d=.43$) degree, but not a doctorate degree ($p=.75$). Attitude and knowledge scores, differentiated by the oral health care professions, are shown in Table III.

Table III. Knowledge, attitude, and practice by profession type (n=286).

	Dentist	Dental Hygienist	Dental Assistant
Knowledge, number of correct responses (SD)*	3.3 (1.1)	3.4 (0.9)	3.1 (0.9)
Attitude, mean (SD)**	4.0 (.60)	3.9 (.60)	3.6 (.80)
	Frequency (%)	Frequency (%)	Frequency (%)
<i>Do you review or assist in reviewing a patient's history with depression during routine dental visits?</i>			
Yes	20 (62.5%)	147 (69.3%)	24 (66.7%)
No	12 (37.5%)	65 (30.7%)	12 (33.3%)
<i>Do you discuss how depression may affect his/her dental homecare routine?</i>			
Yes	13 (40.6%)	85 (40.1%)	15 (41.7%)
No	19 (59.4%)	127 (59.9%)	21 (58.3%)
<i>Have you ever referred or assisted in referring a patient to a mental health specialist?</i>			
Yes	11 (34.4%)	57 (26.9%)	7 (19.4%)
No	21 (65.6%)	155 (73.1%)	29 (80.6%)
<i>Have you ever modified or assisted in modifying treatment recommendations due to a patient's history with depression?</i>			
Yes	18 (56.3%)	114 (53.8%)	14 (38.9%)
No	14 (43.8%)	98 (46.2%)	22 (61.1%)

* SD=standard deviation of the mean. Specialty dentists were removed from analysis due to small sample size (n=2).

**Attitude question response options were a Likert scale with 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. Percentages are a ratio of an endorsed response by the total respondents from the profession type.

Discussion

Findings from this study of dental professionals are consistent with previous research regarding health care professionals' knowledge, attitudes, and practices regarding individuals with mental illness.^{10,19} A 2016 study of Finnish nurses demonstrated that while their attitudes towards patients with schizophrenia were generally positive, there were statistically significant correlations between the providers' attitudes and their experience, age, and mental health education.¹⁹ As each of these variables increased, the level of stigma toward patients with mental illness decreased,¹⁹ a finding that was similar to the oral health care providers in this study.

Research by Corrigan et al. showed that providers with greater personal stigma toward mental illness were less likely

to refill patient's prescriptions and refer to specialists, thus impacting the individual's overall health.¹⁰ Results from this study however, demonstrated that oral healthcare professionals were more likely to inquire about a patient's history with depression if they felt comfortable telling others about their own depression history and had less of a stigma regarding mental health. Better understanding of these correlations regarding the impact of personal stigma can lead to improvements in overall patient care.

Additionally, this study found that previous education experiences were also shown to influence oral health care providers' knowledge, attitudes, and practices toward patients with depression. While it was not possible to determine the exact type of education experience (lecture, clinical rotation, etc.) of the respondents, participants who indicated having had an education that included coursework on mental health were more likely to review a patient's history of depression. A randomized controlled trial by Papish et al. demonstrated that comprehensive, contact-based education as compared to an undergraduate psychiatry course integrating educational strategies was more effective in reducing stigma towards

mental illness among second-year medical students.¹⁷ The "contact-based" approach involves presentations given by patients who share their stories of having a mental illness.¹⁷ Students are given the opportunity to ask the presenters questions regarding their experiences with their illness. This approach aims to reduce stigma by encouraging interpersonal contact with actual patients and can effectively be incorporated into professional health education courses.¹⁷ Improving the attitudes of younger, less experienced oral health professionals could begin with integrating similar experiences into dental education curricula.

Results regarding mental illness knowledge showed little variance in the number of correct responses across each category of oral health professionals (Table I). This lack of variation may have been due to similar levels of knowledge

regarding depression across the oral health professions. It is also possible that the phrasing and multiple-choice format of the survey items may have led respondents to choose similar answers, regardless of the correct answer. The majority of respondents (96%, n=277) overestimated the percentage of depression prevalence in the US (correct response: 7%). In analyzing this response, a key detail has been identified as a possible explanation. The statistic used in the survey referred to people in the US diagnosed with major depressive disorder, which requires the symptoms to persist for two or more weeks. It is possible respondents assumed the term “depression” referred to all forms of depression, including the milder form.

The intent of this study was to address the gap in the literature regarding oral health care professionals’ practices in caring for patients with depression. This study found that nearly one third of the participants reported they did not review or assist in reviewing a patient’s history with depression during dental visits. Results also showed that many oral health care professionals do not review how this medical condition may affect the patient’s homecare practices, nor did they consider treatment modifications due to a patient’s history with depression. It is possible that professionals who responded “no” to one or both of these questions did so because their role in the dental practice does not currently encompass these duties. It is possible that the dentist may have the role of reviewing the patient’s medical history prior to treatment, therefore leading the dental assistant or dental hygienist within the same practice to respond “no”. It is also possible that participants chose this response because depression and other mental health conditions have not been identified. This could be due to lack of a formal diagnosis, lack of patient disclosure, or the omission of depression and other mental health conditions from the medical history form. Also, oral health professionals may be avoiding discussing a patient’s history with depression or making treatment modifications due to their own lack of understanding regarding the impact of mental illnesses on dental treatment and overall health and wellness. Increased education on depression and its effects on oral and systemic health may bring a heightened awareness to the importance of a holistic approach and the need to modify oral health care practices. Treatment modifications may not only improve the quality of care provided to these patients, but also decrease their risk for serious inflammatory conditions including cardiovascular and periodontal disease.^{12,16}

Oral health professionals are responsible for identifying and treating oral diseases. However, the oral health provider role has continued to expand with emerging literature on oral/systemic health relationships. In this study, however, approximately one third of the respondents stated they had

never referred or assisted in referring a patient to a mental health specialist. Taking into consideration the links that have been identified between depression and systemic conditions,^{12,14} oral health providers should consider screening for depression and referring to mental health specialists as a part of routine practice. Preliminary research has shown that general dentists to have a generally positive attitude towards developing a referral system.²³ Doing so in dental settings could provide an opportunity to identify undiagnosed cases of depression, make referrals to mental health specialists, and open discussions regarding how depression may impact an individual’s homecare routine, lifestyle, and overall health.

This study had limitations. Self-report questionnaires may be open to misinterpretation and leave little opportunity for clarification.²⁴ The survey format may have served as a limitation, due to the inability to clarify questions of participants such as the terminology used to classify depression. Participants may also be susceptible to recall bias, particularly when dealing with personal issues and attitudes.²⁴ Also, since respondents participated voluntarily, it is possible that the participants may have a greater interest in depression and mental health issues. Additionally, the professional distribution across the Facebook groups, coalitions, and associations was unknown, and the results may not be generalizable. Finally, although the use of an electronic survey allows for easy distribution, some participants did not complete the entire survey. As a result, non-response bias may play a factor.

Further research with a larger sample of oral health professionals is needed to verify the results of this study. Future studies should also explore the impact of contact-based education strategies on oral health professionals’ attitudes and specific practice modifications. Research is needed to determine whether screening for depression in dental settings and developing a referral system to mental health specialists influences the oral and overall health of patients with depression.

Conclusion

Results from this study showed many oral health professionals do not review or assist in reviewing a patient’s history with depression during dental visits, or discuss the impact of depression on a patient’s homecare routine, nor do they consider treatment modifications due to a patient’s history with depression. This study also showed a link between oral health professionals’ comfort level when seeking mental health care for themselves and the likelihood that they would ask about a patient’s history with depression, indicating that personal stigma could directly affect professional practice. Contact-based education strategies may be an appropriate

addition to oral health curricula, as a means to provide future professionals with early exposure to mental illness and reduce stigmatized views.

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Hispanic Seasonal Farmworker Caregivers' Beliefs and Perceptions of Early Childhood Caries

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Abstract

Purpose: Children of Hispanic seasonal or migrant farmworkers in the United States (US) experience high rates of Early Childhood Caries (ECC) and have high rates of untreated dental caries. The purpose of this study was to explore Hispanic seasonal farmworker caregivers' beliefs and/or perceptions regarding ECC their children's oral health.

Methods: A qualitative explanatory model interview approach was used with a purposive sample of Hispanic parents/caregivers, working and residing in Orange and Ulster Counties, New York. The Explanatory Model Interview Catalogue (EMIC) was used as a guide to the semi-structured, recorded interviews conducted in locations selected by the participants. The texts were independently read and thematically analyzed by two researchers.

Results: A total of 20 parents/ caregivers consented to participate. Six themes were identified for the components of the EMIC and included: etiology: eating candy/sweets (65%); sign/symptoms of decay: tooth color change (50%); pathophysiology: not brushing daily (75%); course of disease/impact on daily life: appearance (40%); impact of caries on child's future health: affects child until adult teeth erupt (25%); treatment for pain: tooth brushing (55%). Over half of the respondents (55%) indicated that getting dental care for their children was a priority.

Conclusion: Results from this study showed that Hispanic seasonal farmworkers have a desire to maintain their children's oral health. However, they lacked knowledge in some key concepts related to the disease process and prevention of ECC. Caregivers need additional oral health education with consideration for oral health literacy.

Keywords: Hispanic seasonal farmworkers, migrant farmworker, early childhood caries, oral health beliefs, caries etiology, qualitative research

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Introduction

Dental caries is one of the most common chronic health conditions among children living in the United States (US).¹ The prevalence of dental caries in 2015-2016 for children aged 2-19 was 45.8%, and of these children, 13% were identified as having untreated dental caries.¹ However, the prevalence of dental caries was reported to be much higher in Mexican – American or other Hispanic children, (57.1%),¹ and Mexican American children suffer from a much higher incidence of untreated dental decay (21.3%).²

Historically, migrant farmworkers have come from Mexico with their families, including spouses and children, for seasonal agricultural work in the US. Hispanic populations have been shown to experience health disparities that are

manifested with higher rates of chronic conditions such as hypertension and type 2 diabetes.^{3,4} Previous research has indicated low health literacy in Spanish-speaking Hispanic adults, which may impact health seeking behaviors and overall health.^{3,4} Acculturation has also been associated with lower levels of health literacy in Hispanic populations.³ Cultural aspects of the Hispanic community must be considered when developing health literacy and education programs.³

Hispanic parents and caregivers have been shown to have strong-rooted health beliefs and may prefer home remedies, rather than over-the-counter drugs, due to cultural health beliefs.^{5,6} Research has shown that Hispanic mothers may also opt for naturopathic or home remedies as the first line

of treatment for signs of illness in their children.⁵ In regards to oral health, studies conducted among Mexican- American mothers indicate gaps in their knowledge regarding caries etiology.⁷⁻¹² Mothers in one study demonstrated an understanding that sugar consumption, oral hygiene and bottle use played a role in tooth decay; however, they lacked knowledge regarding the role of bacteria in the decay process.⁷ These mothers also held the attitude that young children should be able to perform oral hygiene routines independently.⁷ Mexican-American parents have also demonstrated uncertainty regarding the appropriate time for a child's first dental visit, with many young children not seeing a dentist until the age of three or older.⁸ The literature also suggests that there is a delay in initiating oral hygiene in practices among Hispanic mothers.⁹ In a study of Mexican-American mothers, only a minority (13%) followed the recommendation to initiate toothbrushing by 12 months, and 41% did not transition to regular toothbrushing until the age of two or older.⁹ Many mothers held the belief that regular toothbrushing should only begin when the child is able hold the brush without assistance.⁹

Previous research has shown that Hispanic parents/caregivers have a limited understanding of when to start oral hygiene care at home, fail to see the association between a high sugar or carbohydrate diet and dental caries, and understand decay prevention strategies such as fluoride toothpastes and dental sealants.^{13,14} They are also unaware of the importance of routine professional dental care for children, what age to start going to the dentist, and the consequences of an untreated bacterial infection due to dental caries.¹³⁻¹⁵ Much of the research conducted concerning this population is outdated, suggesting the need for further investigation. The purpose of this study was to update the understanding of the perceptions and beliefs of Hispanic seasonal farmworker caregiver's beliefs towards early childhood caries (ECC).

Methods

A qualitative explanatory model interview approach study design¹⁶ was used to gain a deeper understanding of this topic due to the limited available research. The study was granted exempt status by the MCPHS Institutional Review Board. The principal investigator (PI) was of Mexican descent, came from a migrant farmworker family, and was fluent in Spanish and English. The PI's background promoted a sense of trust, which was an important element due to deportation fears that are common among Hispanic seasonal farmworkers who may be undocumented.

Sample population

A purposive, convenience sample was used. Participants were of Hispanic or Mexican descent, eighteen years or older, employed as a seasonal agricultural worker in Orange and Ulster Counties, New York, and were currently caring for a child/children aged five years and under or had previously cared for a child of this age in the past five years. Participants speaking English or Spanish were included; speakers of indigenous Mexican languages were excluded. Participants were recruited by distributing flyers at community events, migrant farmworker health centers, health fairs, and through personal verbal invitations made by the PI on the farms. Snowball sampling was also used to supplement recruitment.¹⁷

Instruments

Demographic data was collected on the following: age, sex, race, ethnicity, number of children in the family or how many children they have cared for under the age of five in the past five years, current employment setting, socioeconomic status, and level of education.

The explanatory model interview catalogue (EMIC) was used to develop the interview questions.¹⁸ The EMIC incorporates epidemiological and anthropological research methods^{18,19} Health beliefs are often culturally based so the EMIC explores patterns of distress, perceived causes of illness, inclinations for seeking treatment, and common illness beliefs constitute a framework for the explanatory model for illness.^{18,20-21} The EMIC approach entailed asking subjects questions through an explanatory procedure of qualitative inquiry. Participants were able to give multi-layered answers and information regarding their experiences with prevention and management of oral disease.^{18,19} The framework for the EMIC questions included: etiology of early childhood caries; complaints (signs and symptoms); pathophysiology, course of the disease, future impact of the disease, and treatment options (Table I).

The interview procedures, questions, and transcription were pilot tested with three seasonal farmworker caregivers who met the sample criteria. Modifications to interview questions were made based on pilot testing and included the use of pictures to help the participant understand the questions being asked. The Flesch-Kincaid Grade Level for the questions was 3.3, with a Flesch Reading Ease of 91.6.

Data Collection

Face to face interviews were conducted in the communities of Goshen and New Paltz, New York, in settings where confidentiality was protected.²² Interview locations were

Table I. EMIC Interview Guide

EMIC Framework	Interview Questions
Etiology	What do you think is the reason why children might have tooth decay? What would you do to make the problem better?
Complaints	What do you think are the main signs and symptoms of decay? How would you describe tooth decay? How do you think these symptoms might affect your child's daily life?
Pathophysiology	Reasons you think your child might not be at risk for tooth decay?
Course of disease	How has tooth decay impacted your child's health or would?
Future implications	How do you think decay will affect your child's life or health?
Treatment	What options do you have if your child has oral pain? What type of home remedies have you used in the past? What stops or prevents you from getting the treatment you choose for your child? Do you have any concerns or fears of your child having treatment for tooth decay or pain?

selected by the participant and included the participant's home, the farm, or the Federally Qualified Health Center where they receive medical and/or dental care. After obtaining informed consent, interviews were conducted in either English or Spanish, based on the participants' preference, and began with the demographic questions. Subsequent questions were posed using the interview guide to address the components of the EMIC.

The purpose and guidelines of the study were reviewed at the beginning of each session. The PI shared her background and interest in the population. Participants were encouraged to speak freely in their own words and share their beliefs and/or perceptions of questions asked. A \$25 gift card for a local grocery store was provided as an incentive. Interviews lasted from 15-35 minutes, depending on the participant. An interview guide was used for all sessions, and the PI took handwritten notes. Audio recordings were transcribed verbatim, and interviews conducted in Spanish were translated by the PI into English. The goal was a minimum sample of 12 participants, and recruitment continued until data saturation was reached, meaning no new themes emerged from the interviews.

Data analysis

Inductive coding was conducted for each component of the EMIC framework. Data was reviewed for like terms, general themes, tones, and impressions independently by two investigators.²³ Specific words and phrases were highlighted to create codes and organized into themes and groups relating to the EMIC framework. Participant quotes were used to illustrate

the depth and breadth of the themes. Interpretation was kept to a minimum by using the participants' own words along with a summary of main themes.

Results

Demographics

A total of 20 parents/caregivers agreed to participate and consisted of fathers (n=6), mothers (n=12) and grandmothers (n=2). The majority of the participants (95%) were born outside of the US, identified Mexico as their country of origin (80%), and had an average of 2.3 children. A little more than one half (52%) of the children were under the age of five years. Participants reported being low-income (median weekly income=\$200-300) and 45% had completed middle school education. Demographics are shown in Table II.

The EMIC framework was used to report the findings, Theme response frequencies are shown in Table III.

Etiology of Early Childhood Caries

Most caregivers stated multiple causes for caries. The most common cause was the consumption of candy/sweets (60%), followed by not brushing (45%), and non-compliance of the parent to perform oral care or resistance of the child (15%). Examples of the theme include:

“Most say it’s because they have do not have good hygiene, eating too many sweets, if you do not drink much milk.”

“What they eat, the sweets.”

“They say that because they eat a lot of sweets, that’s what I’ve heard, but the truth is - who knows.”

When asked how they could make the problem of dental caries better, most caregivers reported using some type of over-the-counter medication.

Complaints related to signs and symptoms

The major themes identified related to sign and symptoms of tooth decay included:

Table II: Demographic Characteristics of Study Population (N=20)

Demographic	N	(%)	Demographic	N	(%)
Gender			Weekly Income		
Male	6	(30%)	\$100-200	2	(10%)
Female	14	(70%)	\$200-300	10	(50%)
Caregiver Type			\$300-400	3	(15%)
Mother	12	(60%)	\$400-500	4	(20%)
Father	6	(30%)	\$500-600	1	(5%)
Grandmother	2	(10%)	Years in the United States		
Age			1-5 years	2	(10%)
18-26	1	(5%)	5-10 years	2	(10%)
27-35	11	(55%)	10-15 years	11	(55%)
36-44	6	(30%)	15-20 years	4	(20%)
45-53	1	(5%)	U.S. Citizen	1	(5%)
54-62	1	(5%)	Number of children in immediate family		
Nationality			One	6	(30%)
Mexican	16	(80%)	Two	5	(25%)
Guatemalan	2	(10%)	Three	6	(30%)
Honduran	1	(5%)	Four	3	(15%)
Puerto Rican/Honduran	1	(5%)	Do any of your children have dental decay?		
Caregiver's Place of Birth			No	15	75%
Mexico	16	(80%)	Yes	4	20%
Guatemala	2	(10%)	No answer	1	5%
Honduras	1	(5%)	What do you feel are more important?		
United States	1	(5%)	Permanent teeth are more important than primary teeth	9	45%
Education			Permanent teeth have the same value	5	25%
None	2	(10%)	No answer	5	25%
Elementary	4	(20%)	Primary teeth are more important than permanent teeth	1	5%
Middle School	9	(45%)			
High School	2	(10%)			
GED	1	(5%)			
College	2	(10%)			

tooth color change (50%) and crankiness/crying inconsolably (40%). An example of the main theme included:

“They get black teeth, yellow, pitted, smelly mouth.”

Regarding the impact of dental caries on daily life, pain was the most common theme expressed by more than one-third of the participants.

“Getting sick and ... then their head starts to hurt.”

Pathophysiology

Three-quarters (75%) of the participants reported their children were caries free based on the outcome of the required dental visit. These participants believed that their children

were not at risk of caries due to daily tooth brushing and because the majority of their children actively attended, or had previously attended, a farmworker daycare center. Children are taught how to brush their teeth and brush after every meal at the daycare centers. The childcare centers require parents to provide proof of visiting the dentist following eruption of the first tooth and every six months thereafter. The major theme for pathophysiology is illustrated by the following statement:

“She goes to a daycare in New Paltz and they teach them how to brush their teeth...from a young age. They arrive, they have breakfast, they brush their teeth, and they have lunch then after they wash their teeth. They are well disciplined there in the daycare.”

Table III. Question response frequencies following the EMIC guide

Response	N	%*	Response	N	%*
Etiology			Course of Disease		
<i>What do you think is the reason why children might have tooth decay?</i>			<i>How do you think decay will affect your child has oral pain?</i>		
Candy/sweets	12	60	Child judged by appearance	8	40
Not tooth brushing	9	45	Child bullied due to appearance	7	35
Lack of insistence of parents	3	15	Child can't eat properly	7	35
Bad diet	2	10	Lose teeth	7	35
<i>What would you do to make the problem better?</i>			Affects child's self-esteem	4	20
Give Tylenol®	9	45	Future impact of tooth decay		
Pay more attention to child's tooth brushing	7	35	<i>How do you think decay will affect your child's life or health?</i>		
Give Motrin®	7	35	Affect child until adulthood	3	15
Not give child candy	4	20	Affect permanent teeth of child	2	10
Take child to the doctor	2	10	Child's health would not be affected	2	10
Take child to the dentist	2	10	Child can't eat well as an adult	2	10
Complaints			Affect child's stomach in future	2	10
<i>What do you think are the main signs and symptoms of decay?</i>			Treatment		
Tooth color change	10	50	<i>What options do you have if your child has oral pain?</i>		
Crankiness/crying inconsolably	8	40	Child brushes teeth after meals in daycare	6	30
Sensitivity	5	25	Child brushes teeth daily	5	25
Bad breath	2	10	Child uses mouthwash	3	15
Tooth color change	2	19	Child uses floss	1	5
<i>How would you describe tooth decay?</i>			<i>What type of home remedies have you used in the past?</i>		
Yellow color	10	50	Cloves	8	40
Black color	7	35	Teac	7	25
Hole	6	30	OTC pain reliever	4	20
Brown	3	15	Garlic	3	15
<i>How do you think these symptoms might affect your child's daily life?</i>			<i>What stops or prevents you from getting the treatment you choose for your child?</i>		
Pain is unbearable	7	35	Nothing	6	30
Get an infection	2	10	Nothing, receiving adequate care	5	25
Can't perform daily activities	2	10	Lack of insurance	2	10
Child can't eat	2	10	Cost	2	10
Pain will go away on its own	2	10	<i>Do you have any concerns or fears of your child having treatment for tooth decay or pain?</i>		
Pathophysiology			No	10	50
<i>Reasons you think your child might not be at risk for tooth decay?</i>			That child may need braces	3	15
Child brushes teeth daily	15	75	Child is too small to have treatment, but would do treatment	3	15
Child visit dentist every six months	2	10			
Child does not eat candy	2	10			
Child eats healthy	2	10			
Child is physically active	2	10			

*% is based on n=20 for each response

Although the majority of the children were considered to be caries free based on caregiver report, 20% of caregivers reported their children still suffered from dental caries. Participants who reported their children had a history of dental caries felt it was due to lack of oral health education in their home country, children not being raised in the US and not having the same healthcare opportunities in their home country. One participant who had a child born outside of the US stated:

“The difference is the place where they were born to start, because here [in the US] you have more access to many things and information. There [in their homeland] is no information or money, much less dentists, are scarce, and that is very difficult.”

Beliefs regarding Early Childhood Caries (ECC)

When discussing the course of early childhood caries, most participants felt their children would be affected/judged by their appearance (40%) or bullied for their appearance (35%). One participant stated the following:

“..He’ll get bullied.”

“Oh, you think he’ll get bullied because of his appearance?” (PI)

“Yes. He won’t smile.”

The second most commonly mentioned effects of ECC was the inability to eat (35%) and tooth loss (35%). Regarding the importance of permanent versus primary dentitions, 45% percent of caregivers felt permanent teeth were most important, 5% felt primary teeth were most important, and 25% felt both primary and permanent teeth had the same value. One participant responded:

“I say that permanent teeth have more value than milk [primary] teeth. Yes, because they are going to stay until they are older and those milk [primary] teeth are going to fall out and they will be replaced and the permanents will not.”

All participants indicated that they wanted the best dental care and outcomes for their children.

“This is the responsibility of the parents. You have to do everything you can as a mother or father, or whatever, to help them first.”

Impact on future health

The effect of dental caries on the child’s future was divided, with about 15% of the participants responding that it would affect the child until adulthood (15%) or affect the permanent teeth (10%). One participant indicated that:

“You can lose your teeth, you can use. I do not know.... I do not know what it is called.”

“Denture” (PI)

“Denture....that can affect the course already for their maturity, to be adults.”

“And it affects a lot, because there are certain foods that one cannot chew, because they’re false, because they are false teeth.”

Other participants did not believe that untreated dental caries was a serious disease without detrimental consequences. One participant stated:

“Well, their health....it’s not a problem.... it’s not permanent and your physical health is fine, it’s just your teeth.”

Treatment

Although some participants mentioned having used home remedies for their own dental conditions such as cloves (40%) and teas (25%), the majority of participants reported having dental insurance coverage for their children and took them to the dentist regularly. Participants reported that if their child needed dental treatment not covered by the child’s dental insurance, that they would find a way to pay for these services. For example:

“I would have to take him, no matter what, I would pay. I will not let something happen to him ...”

Discussion

The majority of participants in this study believed sweets/candy were the main cause of ECC. These findings are consistent with previous research on Hispanic caregiver perceptions of the etiology of dental caries.^{9,12,15} Parents lacked knowledge about the role of bacteria in conjunction with consumption of fermentable carbohydrates in caries etiology. In addition, these participants felt their child would not be at risk for ECC if they brushed their teeth daily. These findings are consistent with previous research on Hispanic caregiver oral health beliefs.^{9,12,15} Although the participants indicated believing that regular tooth brushing is the main reason why their children are not at risk for dental caries, they lacked the knowledge regarding the benefit of fluoridated toothpaste for caries prevention.

While half of the participants caregivers indicated that a change in the tooth color would be the first sign or symptom of ECC, when asked to describe this color change they said it would be a yellowish color. However, when shown a picture of a white-spot lesion, 65% correctly selected it as an early sign of dental caries.

Participants in this study reported using home remedies for oral pain relief for themselves, which is consistent with previous research.²⁴ However, when asked what they would do if their child was experiencing oral pain, the majority indicated that they would visit a dentist and that they would follow through with necessary treatment. Recent research designed to better understand the influence of parental oral health beliefs and behaviors on the caries status of Hispanic children has shown that parents of caries free children reported higher oral hygiene behavior scores, perceived fewer barriers to accessing preventive dental care and considered their children to be more susceptible to caries as compared to parents of children with active caries.²⁵ Parents in the caries free group recognized that their children were more vulnerable to tooth decay and tried to establish good oral hygiene care for their children.²⁵ Oral health care providers need to take the belief system of the parents/caregivers into consideration when planning approaches to improve the oral health of Hispanic children.²⁵

Daycare centers were shown to play an important role in influencing the participants' beliefs and practices regarding ECC. The daycare centers were state funded and followed the American Academy of Pediatric Dentistry guidelines of instituting daily tooth brushing after meals in their facilities and the importance of having a dental home.²⁶ Participants recognized the importance of regular oral care and followed through with the recommended practices. Considering the role that the daycare center can play in influencing the beliefs and practices of this population, including a direct access dental hygienist as a regularly scheduled site visitor could help increase access to preventive services to further reduce the risk for ECC in this population. Dental hygienists are well prepared to expand into a role that could be similar to school nurses. Other approaches for providing health information to this vulnerable population include programs sponsored by community or religious organizations, messaging from media such as television and radio,²⁷ parent education programs at migrant seasonal Head Start and daycare programs,²⁸ and educational programs led by Community Dental Health Workers.²⁹

This study had limitations. Sampling was purposive and not random. The sample size was small; however, this is common in qualitative research.²³ Despite the small sample size, saturation was met, and new information did not contribute to the research topic.³⁰ Although the sample was non-random, using a purposive sample ensured participants were qualified to speak to the research topic and provide essential data and insight.¹⁶ There may also have been recall bias on behalf of the caregivers.²³ Limitations of the EMIC model may include self-report, limitations of participants articulating their beliefs, and the assumption that beliefs about dental caries and causes are related to culture rather than individual beliefs. Data collection was gathered from a

limited geographic location in upstate New York and may not be representative outside of that area. Social desirability on behalf of the participant could also be a limitation. A final limitation was researcher bias, due to oral health knowledge and the sample population.²³ Despite these limitations, findings from this research add to the literature by providing information to oral health care providers regarding this population's ECC knowledge and oral health care practices for their children.

Conclusion

Seasonal Hispanic farmworker caregivers in this study had a desire to maintain their child's oral health. However, they appeared to lack knowledge of some key concepts related to the etiology and prevention of ECC, including the use of fluoride, role of bacteria and fermentable carbohydrates (beyond candy and sweets) in the caries process. Hispanic caregivers need additional oral health education with consideration for oral health literacy and cultural beliefs. Research is needed to include caries risk assessment and oral examinations in farmworker daycare centers further explore the impact of these centers on improving oral health of Hispanic children.

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Research

Direct Access Dental Hygienists' Perceptions Concerning Geriatric Curriculum in Entry-Level Dental Hygiene Programs

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Abstract

Purpose: The growing geriatric population has unique and often complex oral health care needs. The purpose of this study was to explore the perceptions regarding direct access dental hygienists (DH) regarding the geriatric curriculum needed in dental hygiene education programs to prepare DHs to provide direct access care for geriatric populations.

Methods: Purposive and network sampling strategies were used to recruit eligible direct access DHs from across the United States for this qualitative study. Semi-structured telephone interviews were conducted until saturation was met. Demographic data were analyzed using descriptive statistics. Open coding techniques were used to identify themes.

Results: Ten direct access DHs agreed to participate. Nine themes emerged from the data analysis: combining didactic and hands-on experience, how direct access differs from traditional practice, importance of a standardized course in entry-level programs, need for a specialty course in geriatrics, understanding the geriatric patient, understanding direct access settings, modifications to treatment modalities, process of care, and interprofessional knowledge. Participants indicated that entry-level dental hygiene students should be exposed to hands-on clinical rotations, have a standardized aging and geriatrics course, and potentially incorporate geriatrics as a specialty tract within dental hygiene programs.

Conclusion: Geriatrics may not be covered in sufficient depth to prepare entry-level dental hygiene students for work with these populations in direct access settings. Findings from this study may be used to support improvements in geriatric curriculum for entry-level dental hygiene programs. Future research is needed to determine necessary focus and most effective way to disseminate this curricular content.

Key Words: geriatric oral health, geriatrics, dental hygiene education, dental hygiene students, direct access dental hygienists, direct access oral care, dental hygiene workforce models

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Introduction

The scope of practice for dental hygienists (DH) has gradually expanded throughout the United States (US) over the past forty years in an effort to increase access to care.^{1,2} Dental practice acts in 42 states now allow for specially licensed DHs to treat patients in a variety of direct access settings and capacities.³ Direct access allows for a DH to determine, initiate, and maintain treatment with a patient without the specific authorization and presence of a dentist.² The direct access DH utilizes assessments and determines the best course of dental hygiene care for patients.³ The dental hygiene scope of practice is determined by individual state licensing boards and varies widely, as does the degree of supervision required

by a dentist.^{2,3} While the scope of practice varies, in general, all states are moving towards broadening the DH scope of practice in order to benefit underserved populations.²⁻⁴

Many populations suffer from oral health disparities; however, the growing geriatric population is of particular interest. Challenges among this population may include an increased number of medical and dental issues resulting in multifactorial and often complex medical and dental concerns.⁵ The ability to maintain good oral health can have psychological, medical, and social impact, directly affecting an individual's quality of life.^{5,6} Research has shown a correlation between oral health related quality of life and

community dwelling elders' ability to be mobile and a desire to socialize within their communities.⁶ The list of barriers to attaining oral health is extensive for the geriatric population living in long-term care (LTC) facilities.⁶ Geriatric individuals frequently contend with: transportation difficulties; dexterity complications; loss of autonomy; low oral health literacy; and limited or no resources to pay for dental care.⁶⁻⁸ Additionally, many in the geriatric population have complex medical issues, are frail, and deal with chronic pain, so oral health is not a priority.⁶⁻⁸ Poor oral health can negatively impact adequate nutrition, cognitive function, cardiovascular health, and respiratory health. Controlling diabetes and aspiration pneumonia are substantial concerns when oral health is poorly controlled in the elderly.⁶⁻⁸

With the number of geriatric people requiring complex care on the rise, the US health care system must be prepared for this growth with a trained and capable health care workforce.^{9-11, 30} Institutions responsible for educating the health care providers have recognized this need and have increased the amount of geriatric curriculum offered in these programs.^{9-11, 30} However, there is a paucity in current literature to identify recent trends in geriatric curricula among dental hygiene programs in North America. Twenty years ago, Tilliss et al. surveyed dental hygiene programs in the US and Canada and found that 89% of respondents had a didactic component and 54% reported a clinical requirement.¹² More can be found in the literature regarding the geriatric curricular content in dental education.^{13-16, 21, 22, 24} Dental programs have introduced and expanded their geriatric dentistry curriculum in response to the essential demands of this growing population.¹³⁻¹⁶

According to the Commission on Dental Accreditation (CODA) Standard 2-12 (patient care competencies) graduates must be competent in providing dental hygiene care to a geriatric patient and assessing the treatment needs of a patient with special needs.¹⁷ However, CODA has no specifications for any standardized courses on aging and geriatrics and no specific curricular content guidelines related to direct access dental hygiene care for the geriatric population. Given the lack of guidelines regarding the necessary content and the essential needs of the geriatric population, direct access DHs may be a valuable resource. Direct access DHs working with the geriatric population may have valuable insight on what curricular content would best prepare the dental hygiene student for treating this population. The aim of this study was to understand direct access DHs perceptions regarding the pertinent curriculum content needed for dental hygiene students in entry level programs to care for geriatric patients with access to care limitations.

Methods

This qualitative case study design utilized in-depth, semi-structured interview questions to assess direct access DHs perceptions of the geriatric curriculum content requirements in entry-level dental hygiene education programs. The following research questions were utilized to guide the investigation: 1) What are the perceptions of direct access dental hygienists working with the geriatric population concerning the geriatric curricular content and guidelines within an entry-level dental hygiene program? 2) Do direct access dental hygienists perceive a need for a standardized course in aging and geriatric oral health? 3) What information do direct access dental hygienists perceive as most valuable to teach entry-level dental hygiene students concerning working with the geriatric population in a direct access capacity? Data were analyzed using an open coding technique in order to identify themes related to curricular content and educational methodologies. This study received expedited approval from the Institutional Review Boards of the University of Idaho and Pacific University.

Participants were recruited through purposive or network sampling strategies.^{18,19} Direct access DHs currently working with the geriatric population were contacted by email and asked to recommend potential participants. A recruitment guide was used to explain the study and identify interested parties. Direct access DHs then referred other potential participants who were screened as possible participants.

Direct access DHs currently working with the geriatric population a minimum of 8 hours per month for a minimum of 6 months were eligible to participate. Sampling diversity was based on years of treating the geriatric population, less than 5 years or more than 5 years, and the state of licensure and practice. Practice setting variables included working in a nursing home, adult foster care home, hospital, assisted living facility, senior center, community center, memory care facility, or any other facility with geriatric residents. New graduates, inactive and retired DHs, and DHs employed in dental hygiene education were ineligible. The sample was determined by meeting a saturation point in the interview process.^{18,19}

Selected participants were emailed an informed consent form that was returned to the principal investigator (PI). Questions were emailed to participants to review prior to the interview session (Table I). Participant chose a pseudonym that was used throughout the study. Interviews were conducted by the PI over the phone and audio recorded and transcribed by a professional transcription company. Data collection and analysis were performed simultaneously, with each interview leading to new insights and hypothesis testing in the following interview.^{18,19}

Table I. Interview guide

Introductory questions
<ol style="list-style-type: none"> 1. Tell me about your experiences working with the geriatric population. How long have you been working with the geriatric population and in what setting(s)? 2. What drew you to working with this population? 3. What are your greatest challenges and rewards working with this population?
Geriatric curricular content questions
<ol style="list-style-type: none"> 1. What education did you have in dental hygiene school to that prepared you to work with the geriatric population? 2. What types of educational experiences do you believe dental hygiene students in entry-level programs should possess upon graduation? 3. What are your thoughts on the number of hours and number of geriatric patients a student should be required to work with in a clinical setting while in school? 4. What settings would be most beneficial to prepare a dental hygiene student for providing comprehensive care and treatment for the geriatric population?
Standardized geriatric coursework questions
<ol style="list-style-type: none"> 1. What are your thoughts on dental hygiene students having a separate, specific (or standardized) course on aging and geriatric oral health or should topics be blended in other dental hygiene courses? What would a course on aging and geriatric oral and systemic health look like? 2. Would an interprofessional course on aging and geriatrics be more beneficial? Why or why not? 3. What specific topics could be covered in a geriatrics course for dental hygiene students?
Most valuable entry-level geriatric learning experiences for direct access care questions
<ol style="list-style-type: none"> 1. What are your thoughts on specific treatment modalities a dental hygiene student should be comfortable performing in order to be prepared to treat the geriatric population? 2. What are your thoughts on working in alternative setting? What specific information do you feel a dental hygiene student needs to become aware of in working in these settings? How would this information best be presented? 3. Do you feel dental hygienists need an advanced practitioner degree to work with geriatric patients given the complexities of their oral and systemic health? Why or why not?
Closing question
<ol style="list-style-type: none"> 1. Is there anything else that comes to mind, that you want to share related to this topic?

An open coding system was used to organize the data utilizing Nvivo (QSR International, AU). The PI reviewed the open coding words and phrases and performed the analytical coding.¹⁹ The analytical coding from the first interview was compared to the second interview for overlapping patterns. In addition, the second interview was coded for any new ideas. This process was followed for all of the interviews and was used to establish a way to compare and discover new themes throughout the interview process.^{18,19}

Member checks were performed by the PI to establish trustworthiness. Each participant reviewed their interview and transcription for accuracy via a password protected email. If the participant felt they had been misrepresented or their words misconstrued, they were given the opportunity to correct the meaning or intentions. Validity and reliability were established by conducting a pilot interview and peer examination. The pilot interview was conducted with a direct access DH who met the inclusion criteria. The interview was monitored by an experienced qualitative researcher and opportunities to make adjustments to the interview questions and process were provided. The co-investigators reviewed the collected data and subsequent coding to determine the coding accuracy of the PI.

Results

Ten direct access DHs from across the US were interviewed for this qualitative study. All participants were female, between the ages of 32-60 years of age, with an average age of 46 years. Years in practice ranged from 2 to 29 years, with an average of 15.8 years. Years of direct access experience with the geriatric population ranged from 1 to 14 years with an average of 4.8 years. Demographic data is shown in Table II.

Nine themes emerged as the data was analyzed. Themes and related research questions are shown in Table III. A description of each theme follows.

Combining Didactic and Hands-on Experience

When asked how best to prepare entry-level dental hygiene students for direct access practice with the geriatric population, the importance of combining didactic and hands-on experience was a recurring theme. Lyn said, "If students can do a rotation in the nursing home environment, then they can get some great experience and education." Sasha Lee remarked on the importance of experiencing hands-on training, "I had a geriatric component to my [didactic] studies, and I still had no clue." Lou spoke about the importance of hands-on experience because the substantial differences as compared to traditional clinical practice. She said, "I'll see people in their bedroom, in their recliner, in the living room of the adult

Table II. Participant demographics (n=10)

Demographics	n	%
Age		
20-35	2	20%
36-50	4	40%
51-65	4	40%
Years in practice		
1-10	3	30%
11-20	3	30%
21-30	4	40%
Years as a direct access DH		
1-5 year	7	70%
6-10	3	30%
Dental hygiene degree		
B.S	7	70%
A.S	2	20%
A.A	1	10%
States of direct access licensure		
California	1	10%
Oregon	1	10%
South Dakota	1	10%
Texas	1	10%
Utah	2	20%
Virginia	1	10%
Washington	2	20%
Wisconsin	1	10%

family home, and in their wheelchair. Sometimes they're just unable to transfer to a dental chair and it's safest if they just stay where they're at, in a recliner or in a wheelchair."

Differences between direct access and traditional practice settings

The study participants remarked on the distinct differences between traditional dental practice and direct access practice settings. A theme emerged regarding the need for students to be taught and exposed to the varying environments while in still in school in order to be prepared to join the direct access work model. Bri commented, "Just knowing it's okay if you're not doing everything in the exact order and timely manner that they're trying to teach you in school, [or] for a private practice. Students should learn "that it's okay to do things differently, as long as you're safe, and the patient is safe, and you're still practicing aseptic techniques, and universal precautions. The patients don't show up at 9:00 or show up at 10:00 like in a regular dentist office. You have to be more flexible."

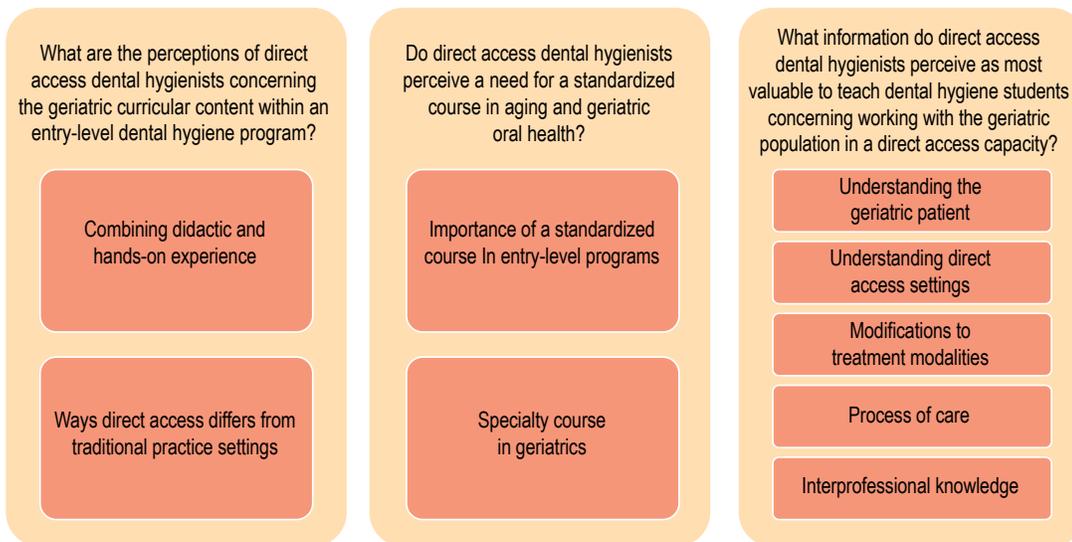
Ruby provided insight into the varying body positions a direct access DH my need to utilize when treating a patient. She said, "I clean teeth standing up. I clean teeth kneeling. I clean teeth sitting on a very adjustable stool. I do it from the left. I do it from the right. I do it from behind the patient. I'm dancing around the patient when I'm providing care because you can't access the mouth and provide care the way we do in traditional clinics."

Importance of a standardized geriatrics course in entry-level programs

The third theme that emerged from the data was whether or not a standardized course was needed to prepare dental hygiene

students to prepare to care for geriatric patients. Many dental hygiene education programs combine geriatric curriculum into another standing course such as special needs patients or public health. Sandra remarked, "I do think it would be beneficial to have a whole course on its own for geriatric patients, I absolutely think it would be beneficial." Ruth stated, "I do agree that there should be a standardized course. The length of the course I'm not sure about".

Table III. Research questions and corresponding themes



Cecelia spoke about the need for a longer, more in-depth course on aging and geriatrics and stated, “How cool would it be if we had a geriatric course that all dental professionals went to with the other [healthcare] professionals that are learning about [geriatric care] as well?”

Specialty course in geriatrics

Participants in this study commented on the importance of including a standardized course in geriatrics in entry-level dental hygiene programs. However, some participants felt a stand-alone course was unrealistic given the challenges of a crowded curriculum. With this consideration another theme emerged on designing a specific specialty course that could be delivered as an elective or a post-graduate course. Cecelia commented, “The students that are interested in geriatrics, they do a geriatric residency, after they graduate. Maybe that’s an additional semester.” Ruth suggested “making geriatrics a specialty within dental hygiene, it could be an online certificate that you earn [post-graduation].” Karen stated, “there’s just not enough time, I think, in a regular hygiene curriculum to hit everything. [Geriatric care] is more of a specialty.”

Understanding the geriatric patient

A theme emerged regarding the wide range of special needs within this population that DH students need to understand along with some of the valuable information that should be included in the curriculum. Cecelia remarked, “We need to understand who these people are. We need to understand where they’ve been in their lives. We need to understand that they’re typically dealing with the three plagues of old age; loneliness, helplessness, and boredom.”

Donna commented on geriatric patient’s impaired physical capacities, and how they may be unable to “turn or move their head, or they have neck problems, or have all kinds of atrophy, or they’re in pain.” Ruby mentioned the variances between a geriatric patient and a younger patient and said, “Your brain is different. Your kidneys are different. Your liver is different. All those things metabolize drugs differently. Polypharmacy is different in an older person than it is in a younger person. There’s just so many topics. There’s at least a dozen different types of dementia, and they all express themselves differently.”

Understanding direct access settings

Participants remarked on the many differences between private practice and direct access settings. A theme emerged on the importance of understanding the settings, who the stakeholders are, which professionals one interacts with, and how a DH may operate within a direct access setting. Bri

explained, “It takes a lot of education and a lot of legwork to get a facility on board with you and some facilities are better than others.” Lou commented, “Sometimes it’s very hard to [gain access into] a facility to even see the residents because [the administrative staff/nurses] are not educated enough on the importance of oral health.” Karen remarked on the importance of understanding and “identifying the key people who are involved in [the geriatric residents] daily care.”

Modifications to treatment modalities

Modification to treatment modalities emerged as a theme, including newer oral care products geared to geriatric populations, techniques simplifying active disease treatment, and routine protocols that facilitate maintaining oral health. Sandra discussed how she “uses the cavitron on maybe half the patients if they can tolerate the water, [and] if they can lean back enough. A lot of times we end up just hand scaling and brushing.” Sasha Lee gave an example of a treatment protocol after hand scaling or ultrasonic use, “if I’m able to floss, I do, but I have to watch them because of biting. I’ll go back through and brush again with chlorhexidine. Then I do my silver diamine, and fluoride varnish on top.”

Process of care

When treating residents of long-term care (LTC) facilities, participants referred to several important aspects necessary to teach students. When speaking about the patients/residents, Karen remarked, “you’re looking at their capabilities? Are they able to do anything on their own? Do they rely solely on somebody to care for them? Are they in a wheelchair? Hospital bed?” Donna said, “Pharmacology is huge for this job. Knowing what all the different meds are and knowing all the oral complications. I see patients who are on aspirin and Eliquis, and they will be bleeding like crazy.”

Interprofessional knowledge

The final theme that emerged from the data was interprofessional knowledge. Lyn said, “Dental hygiene students should have a general understanding of all the health professionals and employees you can encounter in the nursing home setting and other alternate practice settings.” She went on to say, “in long term care settings you’ll see administrators, social workers, resident advocates, activities directors, directors of nursing, nurses, CNAs, dietary services, maintenance, housekeeping, beauticians, and physical therapists.” Participants discussed the various interactions with nursing staff, caregivers, and the many specialists who work with the residents and emphasized the importance of interprofessional education and collaboration.

Discussion

The themes that emerged from this qualitative study reveal the extensive topics direct access DHs believe should be included in an entry-level dental hygiene program. Curriculum content should include both hands-on and didactic content in order to prepare new graduates to work with the geriatric population in LTC facilities and other direct access environments. The literature repeatedly mentions the importance of hands-on geriatric training for dental and dental hygiene students.^{9-16,20-26} A previous study found that half of the surveyed DHs did not have experience treating geriatric residents of LTC facilities; 88% did not perceive themselves as prepared to work with this demographic.²³ If students are not exposed to older adults in LTC at all functioning levels, from independent to frail, they will not be prepared to care for this population post-graduation.¹⁴ Dental hygiene graduates who possess an understanding of the environment they will be working in, and the population they will be treating, will have an easier transition into direct access work.^{9,15} Additionally, early exposure to direct access environments and frail older adults may result in increased numbers of new graduates seeking to work with geriatric populations.²⁰⁻²² Participants felt that hands-on exposure with geriatric rotations was vital in the preparation of dental hygiene students for direct access work in LTC facilities.

Participants stated that while they felt a standardized course on aging and geriatrics would be very valuable, they expressed concern regarding the already crowded entry-level dental hygiene curriculum. As possible solutions, geriatrics as a specialty track within dental hygiene programs, or as a post-graduate program, were suggested. Discussion concerning gerontology as a specialty in dental education programs has been frequently cited in the literature.^{13-15,25} Research relating to geriatric dentistry suggests that when an area of need is recognized as a specialty, such a program may lead to increased interest in that patient care area.^{15,25,30} Current literature addressing dental hygiene educational methodology and geriatric curriculum is limited. Previous research supports incorporating an activity that includes the design, development, and implementation of a simulated geriatric patient experience for dental hygiene students.²⁷ A more contemporary study describes dental hygiene students who experience a practicum involving geriatric patients in LTC facilities, and developed competencies that were transferable to many practice settings.²⁸

Direct access dental hygiene care varies considerably across the US. In some states entry level students are qualified to work as direct access DHs upon graduation, while in

many other states DHs must complete 500-4000 hours of supervised clinical practice prior to receiving their direct access DH designation.² Dental hygiene students interested in specializing in geriatric care could take post-graduate courses while accruing hours of clinical experience.

Themes in this study revealed the importance of inter-professional collaboration and the need for DH students to be familiar with the health professionals they will encounter in a LTC facility. Participants spoke of interactions with physicians, physical therapists, nurses, and social workers, to name a few. Graduates of dental hygiene programs must be prepared to engage with other health care professionals and present themselves as valuable, highly educated oral health care providers. Findings from one study have shown an unmet interprofessional education need in gerontology, particularly in regard to caring for LTC facility residents.²⁹ Institutionalized geriatric patient care cannot be limited to the education and training of one discipline. This population requires an interprofessional team approach focused on comprehensive care.^{25, 29,30}

Results of this study may have been limited by the small number of participants. However, interviews continued until saturation was met. Another possible limitation was that the participants did not represent all direct access DHs currently working with geriatric populations. However, the sample included direct access DHs from a number of states across the US and provided a representative sample of direct access experiences. Study participants were also not dental hygiene educators and therefore lacked knowledge regarding standardized course content and current curriculum guidelines.

Further research is needed to determine the best way to deliver geriatric didactic and practical content to DHs who may be planning to work with this population in direct access settings. There is a vast amount of content to cover on a topic that is frequently placed within a special needs course. Research is needed to determine if this placement is adequate or whether appropriate alternatives should be developed. Additional quantitative research should be conducted to examine and compare variables including amount of experience, year of graduation, scope of practice, and practice variations.

Conclusions

Geriatrics may not be covered in sufficient depth to prepare graduates of entry-level dental hygiene programs to care for geriatric patients in direct access settings. Hands-on experience in direct access practice settings is essential for future direct access DHs. Curricular content in geriatrics must be comprehensive in entry level dental hygiene programs

and consideration should be given to a stand-alone course or specialty track elective option. Dental hygiene students must have interprofessional experiences to learn how to collaborate with other health care professionals in direct access settings. Future research should include more in-depth study of the geriatric curriculum content and optimal placement in entry-level dental hygiene programs.

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Characterization of Tasks and Time Efficiency of Dental Hygiene Students During Clinical Training

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Abstract

Purpose: Dental hygiene graduates often experience significant psychological stress while transitioning from the educational setting to clinical practice environments. The purpose of this study was to characterize the duration of dental hygiene activities and tasks and explore efficiency within appointments, by students in educational programs.

Methods: Right-handed female dental hygiene students were recruited from two dental hygiene education programs. Each participant was video recorded while providing patient care during 3 sessions, once per term, over 3 consecutive terms. Activities, tasks, and student postures and positions were coded across the patient visit. Descriptive analyses were conducted to characterize overall durations and distributions across each category. Time spent on non-dental hygiene related activities was compared to other durations, as well as across the education/training time points and by patient type.

Results: Fifty-three videos were analyzed from nineteen participants. The average patient visit length was 155.06 ± 35.63 minutes; approximately half the visit was dedicated to instrumentation activities. Nearly 20% of the visit was categorized as activities or tasks unrelated to education or patient care. Although most participants completed the patient visit more quickly by the third time point, the percentage of non-dental hygiene activities did not decrease, and there were no associations between patient category type and the duration of the patient visit.

Conclusion: Patient visits were roughly three times the length of the typical dental hygiene care appointment, indicating a disconnect between training and practice. In addition to spending more time on hand scaling tasks, participants spent a lot of time on equipment setup and interacting with or waiting for faculty members. These findings have implications for improving efficiency in educational settings, particularly to facilitate a successful transition to clinical practice.

Keywords: dental hygiene students, clinical education, ergonomics, task analysis

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Introduction

Dental hygienists are licensed health care professionals who provide important preventative oral health services and treatments for a variety of oral diseases.^{1,2} There are over 330 Commission on Dental Accreditation (CODA) accredited dental hygiene education programs in the United States, with approximately 6,700 dental hygiene students graduating annually.^{1,3} The American Dental Education Association (ADEA) requires that dental hygiene education programs teach every clinical skill routinely performed by a registered dental hygienist to competency.⁴ In addition to general education, basic sciences, and dental science courses, accredited dental hygiene programs require an average of 659 clocked hours of

supervised instruction in pre-clinical and clinical practice both within the institution and at extended clinical facilities in the community or in public health settings.²

While current dental hygiene curricula provide a strong focus on the development of basic skills for risk assessment, scaling, polishing, patient education and therapeutic techniques,⁵ many graduates experience difficulties transitioning from educational settings to clinical practice environments.⁶⁻⁸ This transitional period has been found to be a significant source of psychological stress.^{9,10} Although numerous research articles have evaluated the clinical component in dental hygiene educational programs through the aspects

of ergonomic exposure,¹¹⁻¹⁴ instruments used,¹⁵⁻¹⁸ and curriculum design,⁴ little research exists to examine the overall duration, task breakdown and the time efficiency of clinical procedures conducted by dental hygiene students in educational programs that may contribute to psychological stress and poor transition to clinical practice. Therefore, it is important to investigate the distribution of clinical time in an educational setting, relative to the clinical environment, to help bridge the gap between education and practice.

Foundational understanding of time on task will assist in supporting efforts to identify the disconnect between training hours and clinical practice; closing this gap can thereby reduce physical and psychological stress experienced by dental hygiene students. Measuring and describing positioning, behaviors, and the time span associated with various tasks can provide insight into specific areas of focus for other risk exposure assessment and interventions. Video recording and systematic video coding can serve to provide insight to guide the development of teaching techniques and curriculum design to address the disconnects between education experiences and clinical practice. The purpose of this study was to assess and describe the overall duration, task breakdown, and time efficiency of dental hygiene visits/appointments, performed by students in educational programs.

Methods

An observational study design was utilized to characterize the activities and tasks conducted by dental hygiene students during patient visits across the final three consecutive terms within each student's academic program. Twenty right-handed female dental hygiene students were recruited from bachelor's degree programs at two universities, representing approximately one-third of the available student population. All participants were in the second semester of their junior year at the initiation of the study. The study was approved by the institutional review boards at both universities, all participants provided informed consent prior to data collection, and signed a photo/video release form prior to the initiation of individual recording sessions.

Data collection procedures

Video recordings of participants were obtained during patient visits within the academic clinic on dates and times scheduled by supervisors from each respective dental hygiene program. Each participant was scheduled to be recorded at three different time points approximately three months apart during the final three terms of their academic program. During the video recording sessions, three GoPro cameras (GoPro, Inc.; San Mateo, CA) were arranged in orthogonal

positions to capture overhead, front, and lateral views of the participant (Figure 1). Cameras were set up in positions that would not physically obstruct students' performance during the dental hygiene appointment, clearly allowing for identification of the dental hygiene activity or task regardless of student positioning relative to an individual camera. Recording commenced when the student completed all pre-appointment screenings and the patient was cleared for treatment. The recording concluded when the patient left the chair and the student confirmed that the visit was completed.

Figure 1. Synchronized video images used to capture and code dental hygiene tasks and activities. Orthogonal camera views from the front (A), lateral (B), and overhead (C) positions.



Patient case type for each recorded visit was obtained for descriptive and comparative analyses. Both institutions used a five-level categorization system for case type (i.e., Type I – Type V); however, Type V was utilized differently between the two programs. Institution one classified Type V as periodontitis that had progressed beyond the severity of a Type IV, whereas Type V at institution two indicated a patient who had initially received treatment classified as Type II, III or IV and was currently in refractory periodontitis. Despite the different use of Type V, both programs recoded patients to higher or lower categories upon patient reevaluation. Following multiple conversations among the research team that included program directors, dental hygiene faculty, and statisticians, a crosslink for classifying patients in a similar manner from both institutions was developed. Patients at institution one who were a Type V were reclassified to Type IV, and patients at institution two were reclassified from Type V to Type I to create one system for both programs. This resulted in a four-level typology roughly indicating increasingly higher difficulty: Type I – gingival disease/gingivitis/refractory periodontitis, Type II – early/slight periodontitis, Type III – moderate periodontitis, and Type IV – advanced/severe periodontitis.

Video coding

Observer XT (Noldus, Inc.; Wageningen, Netherlands, Version 14.1) software was used to code dental hygiene activities and tasks, as well as other contextual components

across the duration of each video. A standardized coding manual was developed and validated by an interdisciplinary research team that included experts in dental hygiene and occupational analysis. This manual provided definitions for all variables to be coded, as well as a specific protocol for completing the observational analysis. Three coders were trained in the protocol and calibrated through an iterative process of coding three consecutive videos until between-coder reliability (i.e., inter-rater agreement) was greater than 80% across individual codes.

The coding protocol was conducted in two viewing sessions per video. During the first session, coders first identified which activity was occurring from among five primary dental hygiene student activities including: *assessment*, *patient education*, *instrumentation*, *faculty consultation*, and *other*. The *other* activity code encompassed activities that occurred at any given time during the video that were not clearly part of the other four primary activities. In addition to activities, the coder identified when the student hygienist was sitting or standing and in which clock position the student approached the patient. During a second viewing session, nine different tasks were coded during any video segments when instrumentation activity was identified including: *hand scaling*, *ultrasonic scaling*, *instrument sharpening*, *pain management*, *irrigation*, *polishing*, *flossing*, *applying preventative material*, and *miscellaneous*. As with the *other* activity, the *miscellaneous* task code was used when none of the other task codes were clearly applicable during instrumentation time. Brief text was entered into a comment box to describe what was occurring in the video whenever *other* and *miscellaneous* were selected.

Data analysis

To be included in final analysis, the recorded patient session had to meet two criteria: 1) the same student conducted the entire patient visit and 2) ultrasonic scaling and/or hand scaling occurred during the appointment. All behavioral data were exported from the coding software and descriptive statistical analysis was performed using Microsoft Excel 2016, Version 3.0 (Microsoft, Inc.; Redmond, WA.). Descriptive statistical measures included mean, maximum, and minimum duration of patient visits, and mean duration, standard deviation and percent time spent in each activity, task, and positioning code. Case series analysis was conducted for participants from whom videos were obtained at all three time points to examine efficiency during patient visits. The duration of *hand* or *ultrasonic scaling* tasks, *miscellaneous* tasks, and *other* activities were examined across participants by time point and patient category through visual representations of the data. Comments made by the raters to describe *miscellaneous* and *other* codes were extracted and examined to further characterize these time codes in the case series analysis.

Results

A final sample size of 19 participants was included for the data analysis (n=19); one of the original participants dropped out of the dental hygiene program during data collection of this study. A total of 53 video recordings, including up to three videos from each participant, met the criteria for inclusion for analysis. The majority of participants were White (55%) followed by Asian (35%), Hispanic or Latino (30%) and other (10%); and had an average age of 23.75 (SD, 3.38) years. The mean duration of all video recordings was 155.06±35.63 minutes, with a maximum duration of 227.46 minutes and a minimum duration of 78.07 minutes. Table I provides the average durations and distribution of time across all observational codes. On average, participants spent over an hour, roughly half of the patient visit, on instrumentation activities. Within instrumentation, participants spent approximately half an hour completing hand or ultrasonic scaling tasks. About 20% of each patient visit was spent on *other* activities or *miscellaneous* tasks, the latter accounting for a larger proportion of time than ultrasonic scaling. In terms of positioning, participants spent half of the patient visit away from patient, that is, not directly at the patient's side, and about one third of the visit at the 8, 9, or 10 o'clock positions relative to the patient. Over the course of the entire patient visit, participants shifted clock positions an average of 173 times and switched between sitting and standing an average of 28 times during the patient visit.

A case series analysis was conducted using data from 14 participants who had all three video recording sessions, resulting in a total of 42 videos. The frequency of patient types I, II, and III within the recorded sessions were 13, 19, and 9, respectively. The patient type in one session was unable to be determined due to lack of documentation, and no Type IV patients were seen by these 14 participants during recorded sessions. The distribution of patient types across each of the three time points by the total amount of hand or ultrasonic scaling time is presented in Figure 2. Across the three sessions, students were observed to spend more time on scaling during the first session as compared to the later sessions, with decreasing average scaling times from 55.07±11.30 minutes, to 44.05±13.89 minutes, and finally to 43.62±13.34 minutes per session. There was no difference in the distribution of patient types within or across each of the three time points, and there was no apparent relationship between the patient type and amount of scaling time.

The proportion of *other* activities to total patient visit time across the three sessions and by patient type are presented in Figure 3. As with scaling time, there was no observable

Table I. Average duration and overall distribution of time for tasks in a patient visit*

	Duration minutes (SD)**	Percentage of visit or activity***
Operator positions		
Sit	97.83 (33.73)	63.09%
Stand	57.23 (34.75)	36.91%
Clock positions		
Away from patient	77.16 (26.77)	49.74%
8, 9, or 10	56.40 (20.67)	36.36%
11, 12, or 1	20.62 (11.26)	13.29%
2, 3, or 4	0.67 (1.37)	0.43%
5 or 7	0.27 (1.25)	0.17%
Dental hygiene activities		
Instrumentation	76.29 (22.63)	49.29%
Assessment	29.37 (16.05)	18.98%
Faculty consultation	23.25 (13.75)	15.02%
Other	16.54 (14.38)	10.69%
Patient education	8.50 (6.85)	5.49%
Patient is away	0.82 (1.97)	0.53%
Instrumentation tasks		
Hand scaling	37.43 (18.45)	49.14%
Miscellaneous	16.28 (10.02)	21.37%
Ultrasonic scaling	10.11 (11.74)	13.27%
Irrigation	4.23 (3.77)	5.55%
Polishing	2.51 (2.74)	3.30%
Instrument sharpening	1.84 (2.16)	2.42%
Flossing	1.29 (1.65)	1.69%
Pain management	1.28 (2.16)	1.68%
Applying preventive materials	1.19 (1.42)	1.56%

* Ordered within categories from longest to shortest average duration

**Standard deviation

***Proportion of time for positions and activities is calculated based on the average patient visit of 155.06 minutes, and percentages of tasks were calculated using the average instrumentation time of 76.29 minutes.

relationship between the total visit time and patient type; however, two of the longest durations of *other* activity, presented on the vertical axis of Figure 3, were patients of Type III as indicated in purple. Total visit lengths, shown on the horizontal axis, tended to be longer at the first session (circles) as compared to the second (triangles) and third sessions (lines); noted by a higher frequency of circles toward the right end of the chart. By the third session, no patient

Figure 2. Total scaling time as a function of the time points of data collection across the training period.

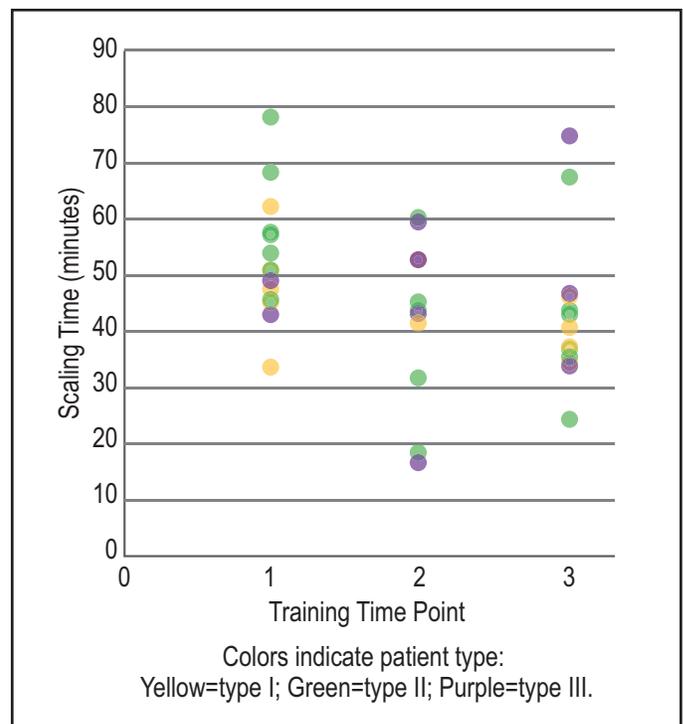


Figure 3. Duration of other activity by the total duration of the patient visit for each recording session.

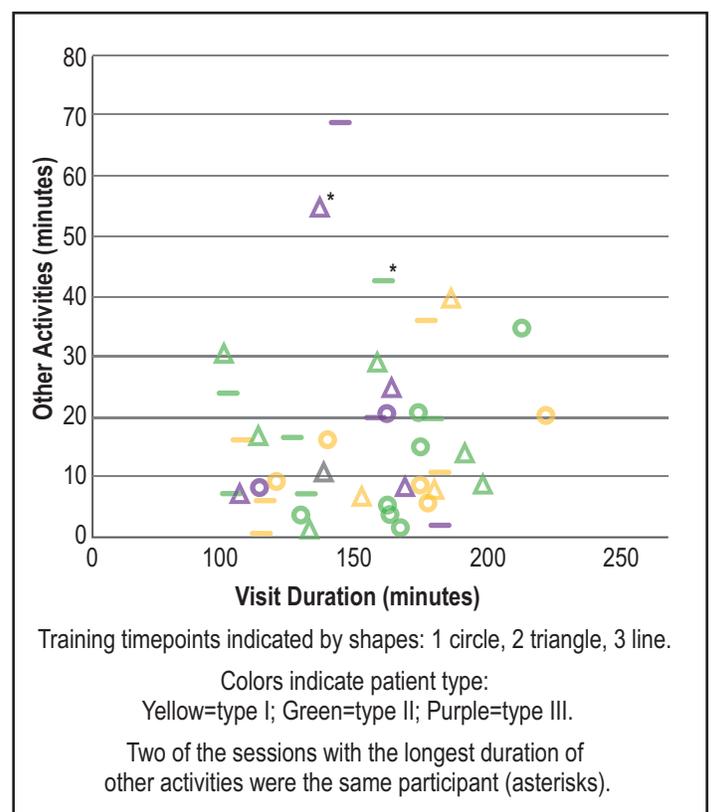
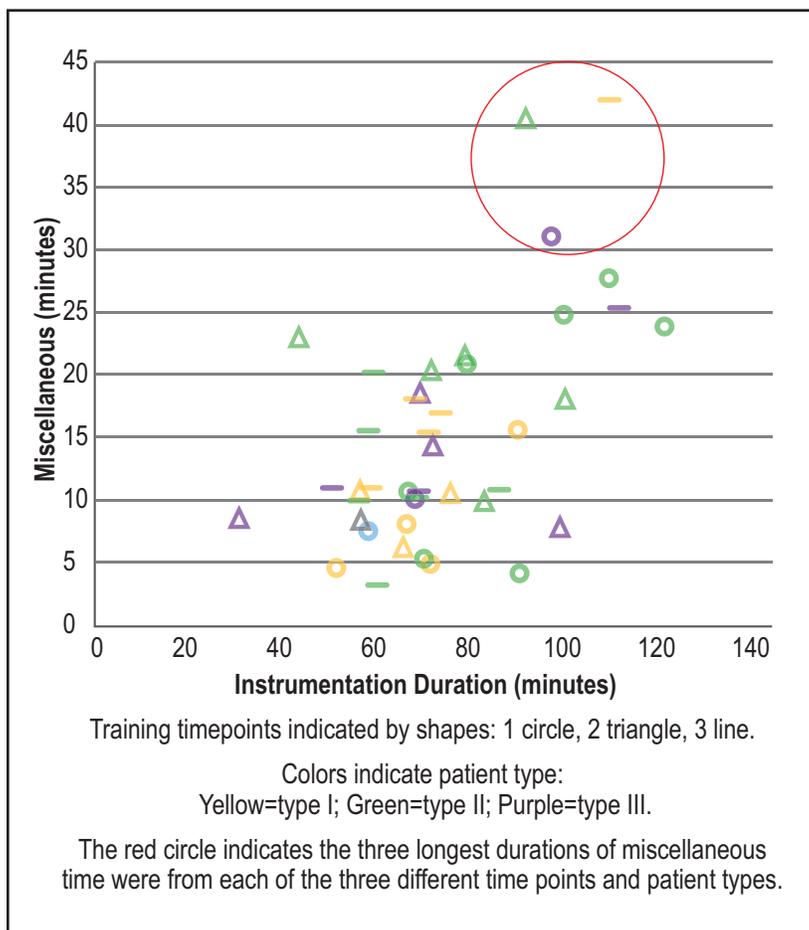


Figure 4. Duration of miscellaneous tasks (vertical) as a function of duration instrumentation time (horizontal) per patient visit.



durations of *miscellaneous* tasks and *instrumentation* time (Pearson's $r = 0.56, p < 0.01$); that is, the longer the *instrumentation* duration, the more *miscellaneous* time. Across all data, the majority of sessions had less than 20 minutes of *miscellaneous* time. The three longest durations of *miscellaneous* time were from each of the three different time points (i.e., all different shapes) and from each of the three different patient types (i.e., all different colors), indicating that there was not a clear association with the duration of *miscellaneous* time to training time point or patient type. Despite the lack of clear association, a general decreasing trend in the frequency of sessions, with more than 20 minutes of *miscellaneous* time, was observed as students progressed in their program (i.e., 5 at time 1, 4 at time 2, and 3 at time 3). Subjective comments from the raters indicated that looking through/arranging instruments, adjusting equipment, preparing for an injection, and talking to a faculty member without clear consultation as part of direct patient care were the most common descriptions of the *miscellaneous* time.

Discussion

The objectives of this study were to describe the breakdown of various activities, tasks, and behaviors of dental hygiene students while in entry level education programs and to examine the efficiency within and across time and by patient types. Although visit lengths decreased across time, the average duration of a patient visit within the student clinic was greater than 2.5 hours; more than triple the duration typically allotted to a patient appointment in a clinical practice setting.² Moreover, although the student dental hygienists spent more than an hour on instrumentation activities, hand or ultrasonic scaling accounted for only half of that time. Together, *other* activities and *miscellaneous* tasks accounted for more than half an hour or 21% of the total patient visit. While there were no clear or meaningful associations identified among various durations of the overall visit and individual activities or tasks to patient type, downward trends were noted across the training time points for all durations. Of most interest is the strong positive association noted between the duration of *miscellaneous* time during instrumentation and the total instrumentation time. These data provide insight into areas of opportunity for improving clinical education

techniques or curriculum design to identify and minimize causes of inefficiency in dental hygiene education.

Current evidence suggests that the typical treatment time of routine dental hygiene care and periodontal maintenance (PM) appointments in clinical settings ranges from 45 to 60 minutes.¹⁻⁶ Although prevailing evidence suggests a maximum appointment time of 60 minutes, one recent study found that a PM appointment may require up to one hour and sixteen minutes to ensure provision of sufficient care.¹⁹ Unfortunately, during clinical dental hygiene education, students required and were given substantially more time to complete a patient appointment, even during the later and final stages of their education. According to the data in this study, even if faculty consultation time were removed from the total appointment duration, students still spent on average more than 2 hours on each patient visit. In fact, the average time spent on the instrumentation activities alone exceeded the typical clinical appointment duration resulting in a disconnect between education and clinical practice. It is important to work to reduce this discrepancy as much as possible, considering that this disconnect has been found to be a significant source of anxiety among dental hygiene students.^{9,10}

Regarding the distribution of dental hygiene activities and tasks in clinical practice, Yee et al found that registered hygienists spent the most time performing scaling (57%) and other tasks related to cleaning (10%), accounting for approximately two-thirds of the patient visit.²⁰ When the time spent in faculty consultation was subtracted, the time proportions identified by Yee et al.²⁰ were similar to the participants in this study. However, participants in this study had a substantially higher percentage of *other/miscellaneous* time (20%) as compared to the registered hygienists in clinical practice who spent only 6% of their time performing other tasks.²⁰ In fact, within clinical practice only around 3 minutes per visit would be 'wasted' time, which is quite low compared to the average of more than 30 minutes in this study of dental hygiene students. Moreover, it is further concerning that a decrease in the amount of *other* activity time across the training period was not identified, with some students maintaining more than 20 minutes of *other/miscellaneous* time, even in the later stages of their education. There is a need to better understand what students are doing during these *other* and *miscellaneous* times, as these may be key areas for improving efficiency and reducing total patient visit length such that it would better prepare students to transition into clinical practice.

Two primary implications for dental hygiene education were identified based on the findings of this study. First, time requirements for each patient visit could be established as one of the standardized criteria for dental hygiene educators to

evaluate student performance during clinical rotations. These time requirements could start similar to what was observed at the beginning of this study and become stricter (i.e., shorter) as the student progresses and increases proficiency. In addition to decreased time allotted for each patient visit, students may also benefit from training on time management skills. This can ensure that students continue to improve proficiency of practice skills while also meeting the time constraints of a busy clinical schedule.

Second, video recording patient sessions may be useful tools and resources within dental hygiene educational settings. Video recording has been used in dental hygiene and dental education for multiple reasons, predominantly as a means of assessing student performance within specific aspects of patient care or dental techniques.²¹⁻²⁴ Given the findings of this study, an additional consideration for the use of videos may be to evaluate the efficiency of individual student hygienists and to identify opportunities for improving the process of care that would reduce the length of the visit. In addition to individual student evaluation, video recording may be an effective way for educational programs to detect common inefficiencies across groups of students, that can be addressed through changes in curriculum and training materials, as well as providing a means for identifying organizational or administrative processes that create barriers for students to work more efficiently. Video recordings can be utilized to enhance faculty calibration, and address faculty and student frustrations with faculty inconsistency²⁵⁻²⁷ by establishing standardized criteria regarding efficiency during clinical rotations.

In addition to these two considerations in dental hygiene education, there are multiple questions to be explained in future research. First, since the use of video may be useful to enhance faculty calibration efforts, it would be beneficial for future research to reveal whether the ratio of clinical faculty instruction has an impact on average time spent per patient visit in educational settings. Second, to identify the sources of the high percentage of *other* and *miscellaneous* times indicated in this study, future research may examine factors such as environmental factors in the student clinics (e.g., transient workstations, checking-out equipment) and student motivation levels while participating in unpaid educational clinical settings. Finally, it would be valuable for future research to investigate the average time that newly graduated dental hygienists spend adjusting to a typical schedule in clinical settings, which may facilitate efforts in bridging the gap between education and practice.

This study had limitations. The participant sample was recruited from only two educational programs. Since teaching methods, curriculum, and clinical settings vary

across institutions, the findings and implications of this study may not be representative of all dental hygiene educational programs. However, given that all educational programs adhere to similar standards, it is likely that these data may be common to many programs and the implications of student hygienist efficiency has relevance to all programs. While combined data across more than 50 patient visits was robust for providing descriptive findings and generalized trends, the overall sample of videos was not adequate to conduct more robust analyses of individual student differences across time or by patient type. Because the times for video recording with each participant were randomly selected, this observational study did not adequately capture all patient types nor ensure an equal distribution necessary to fully evaluate the impact of patient type or difficulty on activity and task patterns. Also, while it is possible that students altered their behavior due to the awareness of being observed (i.e., Hawthorne effect), video recording is a widely used method that has a lower probability of a Hawthorne effect than direct human observation,^{28,29} and the length of time being recorded will likely have minimized any significant effect as students were more apt to forget that they were even been observed.³⁰ Finally, this study did not evaluate or consider the impact of individual student or patient physical health, mental well-being, or other factors, such as a student's academic standing that may have impacted or been impacted by the patterns of practice. It would be useful for future research to consider the reciprocal impact of student practice patterns on these variables.

Conclusion

Findings from this study indicate that the average duration of patient appointments conducted by dental hygiene students is more than three times the typical treatment time allotted in a clinical setting. Up to 20% of the visit time was spent on activities and tasks that were not related to direct patient care or education, as compared to 6% of the time in the clinical setting. While the duration of the patient visit decreased as students neared the end of their education and training, students continued to spend a high percentage of time on unrelated activities and tasks. Because the duration of the patient visit and extraneous time did not significantly decrease over time, there is concern that clinical education models may not be adequately preparing students for a successful transition to clinical practice. This could lead to high levels of stress and anxiety, as well as prompt the onset of early career burnout or other injuries. Dental hygiene educational programs might consider techniques for encouraging increased efficiency across a student's education. Specific recommendations include the establishment of

stricter time constraints during students' clinical sessions and the use of video recording techniques to identify individual or programmatic barriers to efficiency.

Disclosure

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Preventive Dental Care Programs for Children: Parental perceptions and participation barriers

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Abstract

Purpose: Dental caries is a chronic childhood disease disproportionately affecting children from low socioeconomic backgrounds. Free preventive oral health events sponsored by dental organizations are frequently under enrolled. The purpose of this study was to explore parental perceptions and barriers to participation in preventive dental care programs for their children.

Methods: The transtheoretical model and social cognitive theory were used to design this qualitative case study. Open-ended questions were used to interview 20 purposefully sampled participants regarding their perceptions of free preventive dental care programs. Interviews were audio recorded, data were transcribed verbatim, coded, and analyzed thematically until saturation.

Results: Two male and 18 female parents ranging in age from 22 to 49 years, with at least one child enrolled in a Title 1 New York City public elementary school, agreed to participate. Nine themes emerged from the data addressing the primary research question on the perceived barriers preventing parents from allowing their children to attend a free preventative dental care program. The themes included too busy, afraid, lack of trust, cultural differences, lack of awareness of the program, cost of care, money, negative childhood experiences and lack of dental insurance.

Conclusion: Results from this study demonstrate the need to understand barriers to full enrollment in preventive oral health programs. Particular attention should be given to cultural differences between the program providers and the local residents. Preventative oral health program organizers need to explore multiple communication options to notify parents of upcoming programs.

Keywords: dental public health, access to care, dental caries, pediatric oral health

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Introduction

Dental caries is a chronic disease among children with a prevalence higher than asthma.¹ Caries most often affects children's permanent teeth between the ages of 5 and 15 years, following the eruption of the first and second molars.¹ Over the past twenty years, governmental strategic plans have included commitments to eliminate oral health disparities in children.^{2,3} Professional dental organizations frequently offer children residing in at-risk neighborhoods, convenient opportunities to take part in free oral health disease prevention programs, including dental examinations, sealants, and fluoride treatments.²⁻⁵

Oral health disparities continue to exist among low-income racial/ethnic minority groups.³ Data from NHANES 2011-2012 demonstrated that untreated dental caries was twice

as high among Hispanic and non-Hispanic Black children, aged two to eight years, as compared to non-Hispanic White children in the same age group.¹ Improving access to care through public health programs however, does not always lead to an uptake in taking advantage of preventive care opportunities.^{6,7} Children qualified to receive free preventive care frequently lack the required informed consent to attend these programs leaving them susceptible to disproportionately higher levels of dental disease.^{6,7} Insight into the perspectives of parents regarding their children's oral health in general, may help dental disease prevention programs to be more successful in the community and increase in the number of high-risk children receiving preventive dental care.^{3,6-10} Understanding the rationale underlying parental refusal of preventive care

may also help in identifying the social, economic, and policy implications of oral health decision making.⁵

While it is known that that children, up to age 18, of families living below the poverty level are at greater risk than other similarly aged cohorts of developing dental caries,^{3,10,11} it is also noteworthy that the perceived threats due to dental disease, have been found to be low in adolescent populations.⁹ Both adolescents and their parents, have been shown to hold the belief that regular brushing and flossing supersedes the need for preventive care.⁹ The health belief that dental disease does not present a threat to one's health and along with misplaced priorities can influence behaviors. Parents of these children also described going to the dentist as something that that was never done in their family.⁹ Low self-efficacy, as demonstrated by parents who never sought out regular dental care during their own upbringing, can be seen as a barrier to recognizing the importance of preventative dental care for their children. Understanding contributory factors and intervening within a learned behavior occurs in a dynamic social context and includes reciprocal interactions of the person, environment, and behavior.

Participants in pediatric oral health programs have articulated frustrations regarding their lack of access to dental care, with contributory factors including finances, transportation, fear, issues with Medicaid coverage, and parental responsibility.^{7,11,12} However, when preventive services are made available through public health programs, they are not fully utilized.^{6,7} Dental sealants are an example of a preventative service that may be offered through a free public health program. While dental sealants are recommended for all permanent molars, research has shown that sealants are underutilized, particularly among low-income families and in racial and ethnic minority groups.¹³⁻¹⁶

Gaps in the literature indicate a need for further qualitative studies exploring the emotions and attitudes of parents towards their children attending and receiving free preventive dental care.^{6,7,8,11} Identifying and addressing parental attitudes can lead to more effective program design and aid in the reduction of oral health disparities in children. The purpose of this study was to explore parental attitudes, perceptions, and barriers to attending free preventive dental care programs located in designated low-income urban neighborhoods.

Methods

A qualitative case study design was used to explore oral health perceptions and dental care behaviors of parents of children, attending a Title I New York City elementary school, over a six-week period in 2017. The study received

approval by Walden University Institutional Review Board (IRB # 04-21-17-0456669). Data collection instruments included an anecdotal observation form¹⁷ and an open-ended interview script. Observations included body language, attitudes towards the interviewer, preventive programs, and their child's oral health. The observation checklist allowed the principal investigator (PI) to visually describe the parent participants during, and after data analysis.

Upon completion of the informed consent document, twenty interviews were conducted and recorded face-to-face with the PI and the parent or guardian. The survey instrument consisted of 22 semi-structured and open-ended questions, inspired by a similar seminal qualitative study by Kelly et al.¹⁸ Modifications were made to the instrument to include multicultural specificity. The survey was pilot tested on six professional colleague parents for clarity and validity; no further revisions were necessary. The interview questions utilized constructs from the Social Cognitive Theory (SCT) and Trans Theoretical Model (TTM) to demonstrate self-efficacy in the parent or guardian's dental care seeking habits, self-efficacy of their children's oral health, and their stages of contemplation of change.¹⁹ This framework was chosen in order gain a better understanding of parental perceptions of barriers to care and low self-efficacy.

Sample selection

The sample population consisted of parents/caregivers of one or more children, between the ages of 5 and 15 years, attending a Title I New York City (NYC) public school that was also providing free lunches. These schools serve families with low incomes, with many earning below \$24,240 for a family of four.²⁰ Inclusion criteria were being a parent or guardian over the age of 18 and the ability to speak and read English. Recruitment consisted of posting flyers in public places near three randomly chosen Title 1 elementary schools. The first group of parents were recruited in Manhattan, Chinatown (Site 1), group two were recruited in Brooklyn (Site 2), and group three was recruited on Staten Island (Site 3). Interested participants who met the inclusion criteria were asked to sign an informed consent form prior to an interview. Incentives to participate included a \$5.50 MetroCard and \$15.00 gift card.

Interview process

The in-depth interviews were held in a location selected by the participant and included settings such as local libraries and a coffee shop. Participant comfort during the audio recorded interview allowed for detailed discussion regarding their views and past experiences of free dental programs and enabled the PI to prompt and explore the ideas and issues

that emerged. Interviews were timed and lasted for a maximum of 20 minutes. The fieldwork consisted of reflective journaling at the interview settings, and audio recording conversations and interviews. Audio recording interviews allowed for verbatim transcription and analysis.

The purposefully descriptive case study design facilitated a thorough understanding of participants' feelings.^{21,22} Precoding scrutinized the data by pointing to deeper issues that deserved further attention prior to the formation of the data matrices.²³ The matrices intended to show sequential steps used to link the emerging themes and provide credibility. The interviews, PI's notes, and observations were transcribed into a matrix and placed into the software program NVivo11 Pro (QSR International, Doncaster, AU). Transcribed interview data were coded for themes. Axial coding involved the linking of data to reveal categories and themes. Selective coding involved identifying relationships between categories and their integration into the axial coding model in order to develop themes. Lastly, advanced coding was performed to situate the final codes in relationship to main themes of the study.

Investigator triangulation ensured consistency in interpretation of the data. Constant comparative analysis was performed. Each interview was transcribed and analyzed prior to recruiting any future participants to ensure that the generated hypotheses were continuously verified and developed until saturation.

Table I. Participant demographics (n=20)

Ethnicity	n
White	3
Hispanic or Latino	4
Black or African American	7
Asian/Pacific Islander	5
South Asian/India	1

Results

Two male and 18 female parents ranging in age from 22 to 49 years agreed to participate. Participants had children ranging in age from 18 months to 20 years and each participant had at least one child enrolled in a Title 1 NYC public elementary school. On the average, each household in the study had two children, however two households had up to eight children. Participants were from low socioeconomic backgrounds and resided in low-income neighborhoods. The sample population was representative of the high-risk demographic for children with oral health disparities. Complete demographic data is shown in Table I.

Nine themes emerged from the data relating to the primary research question regarding the perceived barriers preventing parents/caregivers from allowing their children to attend a free preventive dental care program. Sub questions related to parental trust and how to effectively promote preventive dental programs were also addressed.

Table II. Perceived barriers related to time and fear

Key themes	Categories	Selected extract
Busy, no time	Scheduling Transportation Laziness	<p>"Too busy"</p> <p>"I don't have the time, it's not important, not the number one thing"</p> <p>"Convenience, laziness, I'm being absolutely honest, ummmm, parents want convenience"</p> <p>"I would say scheduling, that it could be transportation and scheduling and staying organized if you have more than one kid"</p>
Scared	Might hurt Concerned about cost Worried about care	<p>"They're scared, or the parents themselves are scared"</p> <p>"Maybe the child is scared, or maybe the parents feel like the work their child may need might be a lot"</p> <p>"Going to the dentist is scary and it might hurt"</p>

The first theme, "too busy," captured how participants described potential reasons including transportation, scheduling and laziness for not escorting their children to preventive oral health programs. Theme two was "scared or fear" which reflected how participants described their own feelings regarding going to the dentist or how they thought their children would react (Table II).

The third theme, "cultural differences," related to cultural influences on preventive health care decision making, how cultural dissimilarities impacted decisions on how parents chose oral health providers, and why parents decide not to seek preventive services. Participants were hesitant to attend a program where their own ethnic background was not represented. The fourth theme, lack of trust, emerged as parents expressed concerns over dental professionals not speaking their language or not looking the way they did. Parents were hesitant

Table III. Barriers related to trust and culture

Key themes	Categories	Selected extract
Trust not an issue	Did it as a child Recommended Benefit	<p>“I grew up in Japan and every year we would see a different dentist I think every year for me it’s so natural”</p> <p>“I mean if it’s like a dentist I don’t know or not recommended maybe I would be a little bit more cautious”</p> <p>“It’s a benefit to child and parent not to run around and find someone”</p>
Trust is an issue	Communication/ language barrier Lack of education Unsure of motive Cultural	<p>“I would be more open to someone who speaks my language”</p> <p>“It was trust ... I had heard it was interns and they didn’t know what they were doing”</p> <p>“What’s the motive, what are they getting out of it? They don’t want to genuinely help us when that’s the not the case all the time”</p> <p>“I think it’s the trust of confidentiality, we live in a society where it has been broken a lot, so it’s more so anytime you hear you need to give social or private information”</p> <p>“Culturally no matter what race you are, pride is always an issue”</p>

to attend a program where their “ethnic background was not represented.” These themes are presented in Table III..

The fifth theme, “unawareness,” involved the participants lack of knowledge regarding the free preventive programs. Responses in this category ranged from language and literacy barriers to lost forms and included recommendations for better communication methods (Table IV). The sixth and seventh themes were related to cost of care and finances. The eighth theme, “negative experiences or traumatizing childhood experiences,” related to how some parents described receiving dental care as children. The ninth theme, “lack of dental insurance,” was expressed as a barrier to dental care visits. Most parents expressed that they “would not go to the dentist without dental insurance.”

Discussion

Results from this study confirm the themes of time, cost, lack of insurance, and fear that have been identified in previous studies.^{11,12,14} Additional themes such as lack of trust and cultural differences were also identified. The results validated that cultural sensitivity and trust in dental professionals continue to be lacking in low-income, culturally diverse populations.^{6,12,24} Educating and supporting care-givers on the importance of oral health care is integral to improving children’s oral health.^{6,7,24} Findings from this study substantiate the continued need for cultural competency and sensitivity within public health areas.

Guarnizo-Herrano, et al., suggested that there was limited evidence-based knowledge regarding how parental influence affects preventive dental-care-seeking behavior for children.¹² The low-income, culturally diverse parents in this study held the attitude regarding preventative dental care of “out of sight, out of mind and if it’s not bad, no worries” which may influence their decisions to opt out of participation in a preventative care program. The participants attitudes towards seeking preventative oral care, rather than emergency based care, for themselves as well as their children was also similar to research on pregnant mothers and routine dental care for their children.²⁵ Mothers’ oral health knowledge, behaviors and attitudes have been shown to impact the value that they place on preventive care for their children.²⁵ Results from this study also support the findings of Divaris et al., on the role of parental influence on their children’s entrance into the dental care system.⁷ Low perceptions of the threat of dental disease may reduce children’s oral health care to an as-necessary or emergency only, basis.⁷

Baldani et al., suggested that cultural beliefs and perceptions regarding the need for oral health care key are predictors of access for low-income children.²⁴ Findings from this study also demonstrate how the role of parental belief systems can positively and negatively influence ways that parents seek free preventive care. While mothers identifying with poor oral hygiene habits and infrequent dental visits have been shown to negatively influence the oral hygiene habits and frequency of dental visits of their toddlers,²⁵ participants in this study who did not have dental care as children, self-reported wanting to take their children to the dentist.

A significant finding in this study was the role of culture and ethnicity played in influencing permission for participation in an oral health program and should be further investigated with the additional elements of family history, language, immigration status and neighborhood demographics. Multiple ethnic groups participated in the current study. It is worth noting that the majority of parents identifying as Black expressed a lack of trust in free preventive oral health services as compared to the Asian participants. This

Table IV. Barriers related to program awareness

Key themes	Categories	Selected extract
Unaware of program	Advertise more	“They don’t advertise it much”
	Notices or consent forms in my language	“Sometimes when it is so public people tend not to go, but when it’s a bit more private they do attend”
	Send reminder	“I could not read the language”
		“I just wish the schools took more time to speak to the parents I think that’s what it is mostly”
		“Lack of information, really parents might not be aware of what’s available”
		“They would send a paper and we used to throw it away. We didn’t even look at it we can’t read the paper”
		“Sending reminders out with texting helps tech savvy text messages help better than the email or voicemail. As a parent, when do we have time to sit down and read our emails at the end of the day?”

could be due to the Asian participants having been exposed to preventive oral health care services during childhood.²⁶ Future research should examine the role of culture and ethnicity to exposures to preventive dental care during one’s childhood and subsequent enrollment in public health programs. Given the skepticism expressed by some of the participants regarding who is sponsoring the oral health initiatives, there is also a need to incorporate more leaders and dental professionals reflective of the ethnicities of the local neighborhood to increase trust and participation.²⁶

Social phenomena such as facial recognition of leaders as well as referrals and recommendations of providers and health services play a part in how members of certain cultures seek preventive oral health care.²⁷ Participants in this study identified “referrals, recommendations, and recognition of community leaders” as ways to encourage parental consent. More information is needed to better understand how interactions in social networks relate to how parents seek preventive oral health services or conversely deny preventive care opportunities.

Parent participants expressed they were “unaware of the program,” or reported a lack of knowledge about a free preventive program for their children, concept that has not been previously explored. Participants suggested letters sent home were often misplaced or unread, “they would send a paper and we used to throw it away we didn’t even look at it, we can’t read the paper”. Electronic communication such as emails were also ineffective with participants stating that they lacked the time to read them. Participants suggested that text messaging or phone notifications may be more effective means of communication. Taking into consideration the literacy levels of the community along with the multiple responsibilities of working parents, developing communication strategies recommended by the parents themselves, might increase the acceptance of

preventive dental care programs and overall enrollment.

This study had limitations. In discussing personal information, such as the oral and dental care habits of parents and their children, there was a possibility of response bias. Participants could have altered their responses, to please the interviewer. While the majority of participants stated that they would allow their children to attend a preventive oral health program, it was not possible to confirm that they had actually attended. The study sample was also small and limited to one urban city in the United States. Future research should be designed to include a larger sample size of parents/caregivers in multiple locations with multiple interviewers to increase validity and generalization of results.

Conclusion

Untreated dental disease is a painful condition and children do not have a voice in seeking preventive care. Parents and caregivers may not fully understand the consequences of declining participation in free preventive oral health programs due to low perceptions regarding the consequences of dental disease. Findings from this study also illustrate the need for dental professionals to be from the community or physically resemble the individuals found in the neighborhood and have a passion for enabling change. Preventative oral health program organizers need to explore multiple communication options to notify parents of upcoming programs.

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Innovations in Dental Hygiene Education

Online Dental Hygiene Degree Completion Program: Outcomes of a longitudinal study

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Abstract

Purpose: Examining the long-term outcomes of education programs delivered online can help assess the impact of the program on graduates and the value of the delivery format. The purpose of this study was to measure the overall outcomes of an online dental hygiene degree completion program and identify key alumni outcomes.

Methods: A 35 item electronic survey was delivered via email to all graduates (2009-2017) of an online degree completion program based in Ann Arbor, Michigan, two years following program completion. Survey items included Likert scale, closed and open-ended questions focusing on career characteristics, leadership, scholarly activities, evidence- and community-based practices, professional confidence, and transformative learning. Descriptive and inferential statistics were used to analyze the data.

Results: Of the nine alumni cohorts (n=75), 50 graduates participated in the survey for a response rate of 67%. Eighty-two percent of respondents felt they had more career options after graduation and reported post-degree career activities that included dental hygiene instruction (36%), public health (32%), and administration (14%). There was a statistically significant increase in the instructor/educator role of the participants post-graduation ($p = 0.000$). The majority (94%) indicated the program improved their competency in areas of leadership and evidence-based practice and all (100%) indicated a greater responsibility to use their professional skills to address oral health disparities in their communities

Conclusion: Graduates of the online degree completion program reported ongoing activities in key areas of leadership, evidence- and community-based practice. Future research should focus on ensuring that program goals reflect the evolving dental hygiene profession and program delivery practices meet the needs of the working professional student.

Keywords: dental hygiene education, e-learning technology, distance education, online learning, degree completion

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Introduction

The dental hygiene profession has been advocating for the baccalaureate-prepared hygienist as the entry-level degree for several decades.¹ As oral health care is integrated into total health care, the profession recognized it must position itself for these changes and cultivate graduates who are able to advance and explore diverse and evolving roles. According to the Commission on Dental Accreditation 2018-19 dental hygiene education program survey, there are 327 entry-level dental hygiene programs in the United States (US).² Of those programs, only 51 (15%) confer a bachelor's degree in dental hygiene, 8 (2%) programs confer other baccalaureate degrees, 265 (81%) confer an associate's degree or certificate, and 1 (.3%) confer another degree. The profession has recognized

the need to create a path for associate degree-prepared dental hygienists to complete the remaining academic credits towards a baccalaureate degree. Degree completion programs offer the associate-prepared dental hygienist a mechanism for completing their bachelor's degree and expanding their professional opportunities beyond clinical practice in roles such as educator, researcher, entrepreneur, public health professional, administrator, and corporate management.³

Historically degree completion programs have been structured as face-to-face courses offered on a traditional college campus. Face-to-face degree completion programs have been available in the US for decades. Limitations of the

on-campus delivery method have been its lack of support for the working professional who needed to balance educational goals with employment and/or personal commitments. Traditional delivery models often required the professional to relocate to be closer to campus. Educational courses delivered primarily or fully online have offered increased access to higher education for a variety of professions.⁴

Dental hygiene education programs have established distance or online programs to allow working professionals access to the necessary coursework for a bachelor's degree.⁵ Degree completion programs offered as hybrids (partially online) or fully online are becoming increasingly popular among associate degree or certificate-prepared dental hygienists as a way to remain in clinical practice, maintain personal responsibilities, and live in their community of choice, while pursuing their educational goals.⁴ Out of the 51 degree completion programs in the US, 27 (55%) are fully online, 11 (25%) are hybrids, and 13 (20%) are face-to-face.⁶

In order to meet the demands of the working professional, University of Michigan Dental Hygiene (UM DH) launched a fully online, degree completion "E-Learning" program in 2008. The intent of this new design was to create program goals and a curriculum consistent with expanded roles and career opportunities, to focus on development of future leaders in the profession, and to prepare dental hygienists to work as members of multidisciplinary health care teams (Table I). The 2005 ADHA report *Dental Hygiene: Focus on Advancing the Profession* provided the foundation for the program goals, competencies, and 11-course framework.⁷ Program goals were also crafted to align with the missions of the University and the School of Dentistry. Equally important was the assimilation of technology into the course design and delivery process. Equitable access to technology, computer literacy, and seamless technology interface were considered as vital to the program development as the educational andragogy.⁸

Table I. UM DH Degree Completion E-Learning program goals and competencies

Program Goals	Competency Domains
Develop leaders in the dental hygiene profession.	Professional Development and Leadership
Prepare dental hygienists to work as members of multidisciplinary health care teams and in alternative practice settings.	Professional Communication Health Promotion and Disease Prevention
Prepare dental hygienists for expanded roles and career opportunities.	Evidence-Based Practice Community-Based Oral Health

At the time the UM-DH E-Learning program was developed, it is important to note that the existing face-to-face courses were not simply adapted to fit the new online platform. The E-Learning program framework was created from the ground up and included original curriculum development, best-practices in online education and admissions, mixed-method evaluation, marketing plans, and faculty professional development focusing on online learning and teaching. Comprehensive information on the models and best practices used in developing the UM DH E-Learning program are provided in Gwozdek et al.⁵ In 2012, a second report by Gwozdek et al. was published, evaluating the outcomes of the first two cohorts.⁹

Initial outcomes assisted the E-Learning program developers to better understand the more immediate impact of the program on student growth and their interaction with the curriculum and online environment. Although the outcomes of the first two cohorts were positive, longitudinal evaluations assessing student change over time can provide a more complete picture of the overall effectiveness of the educational program. The purpose of this study was to determine the longer-term outcomes of the UM DH Degree Completion E-Learning program by measuring its impact in three key areas: meeting programmatic goals, key graduate outcomes of the program, and graduate value of the online delivery option.

Methods

This study was deemed exempt from Institutional Review Board (IRB) oversight by University of Michigan IRB for Behavioral and Health Sciences [HUM 00018836]. A 35-item, two-year post-graduation, electronic survey was pilot tested by five dental hygiene educators; survey modifications were made based on their feedback. The survey was disseminated via email to the 75 graduates from the nine cohorts (2009-2017) of the E-Learning program. Qualtrics® (Provo, UT) online survey software was used for distribution, collection, and storage of the anonymous survey data. Participants had two weeks to respond and were sent reminder emails each week.

Survey Instrument

The survey instrument utilized qualitative and quantitative research strategies; items included demographic, numeric Likert scale, fixed response, and open-ended questions. Program impact was determined by assessing participant interaction with the program goals and competencies, specifically the competency domains

of *Professional Development and Leadership, Evidence-based Practice, and Community-based Oral Health*. Graduate outcomes were measured based on self-reported pre-and post-program activities and included: a) career and professional development characteristics, b) leadership, advanced education, and scholarly activities, c) evidence-based and community-based practice, d) professional confidence and credibility, and e) impact of online delivery method on learning.

Statistical Analysis

Responses to open-ended questions were evaluated by three investigators to identify common themes and then coded. Seven key categories emerged from the responses. Many respondents indicated more than one key outcome; thus, one response could have been recorded into multiple categories. Descriptive and inferential statistics were obtained using SPSS® v24 (IBM; Armonk, NY) and Excel 2016 (Microsoft; Bellevue, WA). Chi-Square tests of independence were used to determine differences in distributions between numbers of hours reported participating in pre- and post-program professional roles. Statistical significance was set at $p < 0.05$.

Results

The survey captured feedback from 50 of 75 alumni (n=75) from nine cohorts graduating from 2009 to 2017, yielding a response rate of 67%. All of the respondents were licensed dental hygienists in the US and female. Ages ranged from 21-55 years old. Prior to enrolling in the program, 57% had been practicing dental hygiene for less than five years, 16% for 6-9 years, and 28% for more than 10 years. While enrolled in the program, 93% worked full or part-time and 45% were caregivers for children. Eighty-seven percent of respondents were Michigan residents while they were in the program.

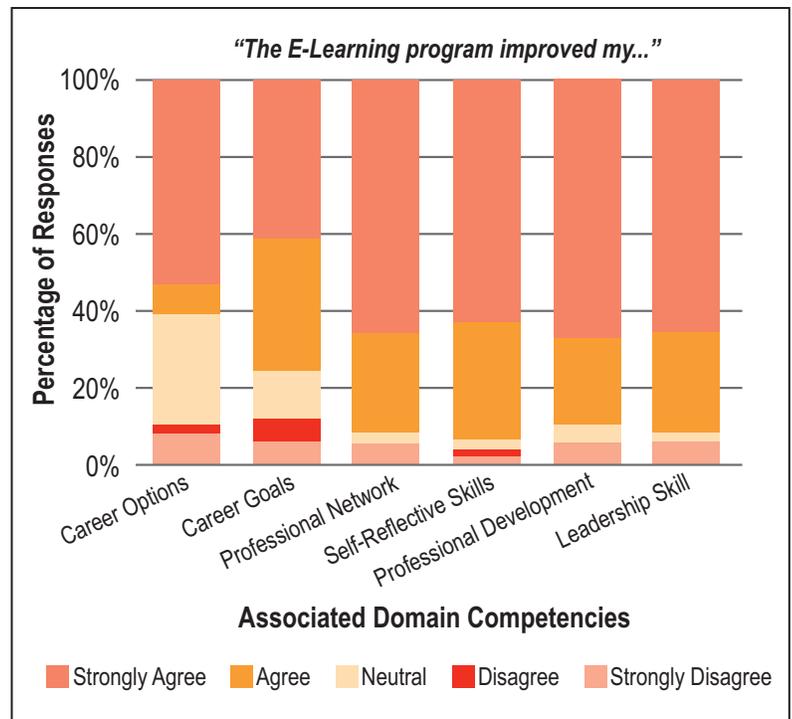
Meeting Programmatic Goals

Professional Development and Leadership

Survey questions eliciting responses around the following areas: a) changes in post-program career or professional opportunities, b) professional networking, c) self-assessment/reflection, and d) leadership skills/activities were aligned with competencies in the *Professional Development and Leadership* domain (Figure 1). Eighty-two percent of respondents agreed/strongly agreed that they had more career options post program. Seventy-six percent believed the program helped them achieve their career goals with 92% feeling the program broadened their professional

network and increased their leadership skills. Ninety percent felt the program increased their commitment to professional development and lifelong learning.

Figure 1. E-Learning program impact on professional development and leadership (n=49)



A majority of the respondents (94%) felt the program developed their reflective practice skills. Additionally, the vast majority rated the impact of the ePortfolio reflections completed at the end of each course positively (95%) and felt that the final self-presentation portfolio helped to make them feel “more confident” in their professional skills (97%). Most respondents (94%) agreed/strongly agreed that the program improved their leadership skills. Leadership positions reported by 26% of respondents included all levels of positions in their local, state and national professional associations, dental practices, and sales management positions. Association roles included chair of special interest group (SIG), faculty-student liaison, delegate, trustee, treasurer, secretary, vice president, and president. Respondents reported 24 experiences with scholarly activities during or post enrollment in the program including seven publications in national journals, eight national awards, two UM School of Dentistry awards, and seven national and international conference poster presentations.

Evidence-Based Practice

Survey questions eliciting responses regarding the use of evidence-based decision making in all dental hygiene practice settings and the ability to think critically and solve problems were aligned with competencies in the *Evidence-Based Practice* domain (Figure 2). The majority (94%) agreed/strongly agreed that the program increased

their ability to provide evidence-based, comprehensive patient care and that the program increased their ability to think critically, solve problems, and make decisions.

Figure 2. E-Learning program impact on evidence-based practice (n=49)

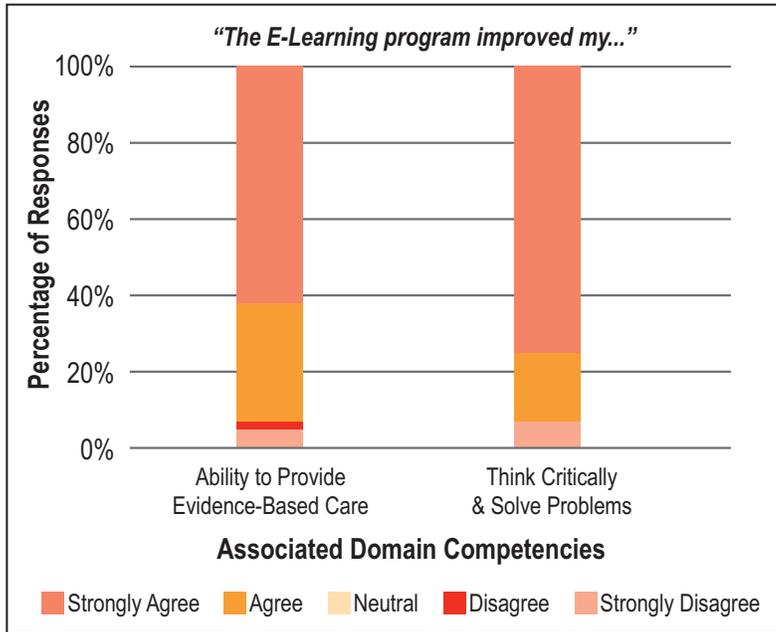
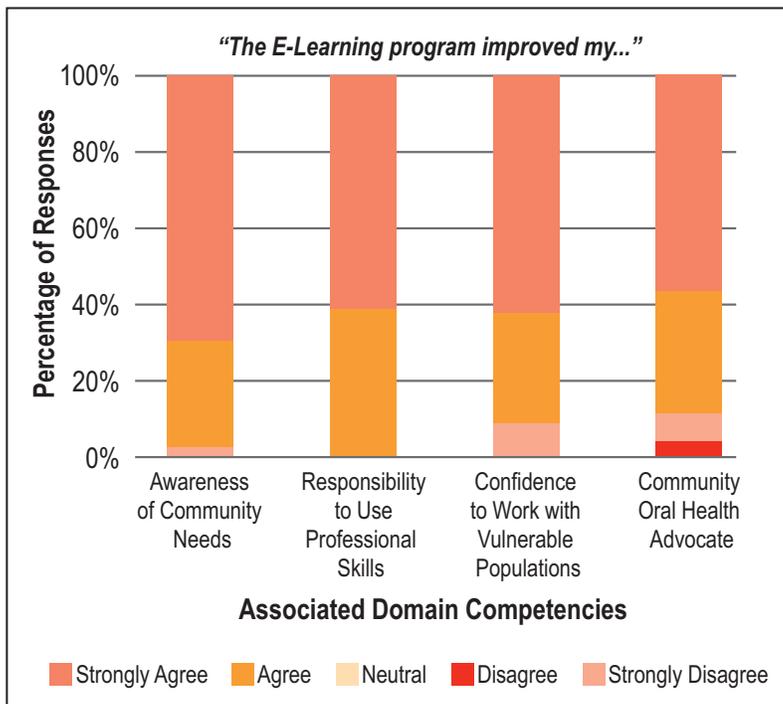


Figure 3. E-Learning program impact on community-based practice behaviors (n=46)



Community-Based Oral Health

Survey questions eliciting responses in the following areas: a) greater awareness of oral health needs in the community, b) sense of responsibility

to use professional skills to address oral health disparities in the community, c) confidence to work with vulnerable and underserved populations, and d) sense of self as a community oral health care advocate were aligned with competencies in the *Community-Based Oral Health* domain (Figure 3). Based on experiences in the E-Learning program, nearly all respondents agreed/strongly agreed (98%) that they developed a greater awareness of the oral health needs within their own community. As a result of the program, the majority of respondents also agreed/strongly agreed (91%) that they had developed greater confidence to work with elderly, culturally diverse, disadvantaged, and/or physically challenged populations.

Pre- and Post-program Activities

Respondents were asked to share the roles they were participating in two years prior and two years after the E-Learning program (Table II). Responses were recorded in terms of frequency of time spent (none, 1-16 hrs/wk, 17-31 hrs/wk, and 32+ hrs/wk). Over half the respondents (61%) identified as having been a student two years before the program and 35% still identified as being a student two years after the program. Those who identified as being a student post-program, indicated pursuing advanced areas of study including education technology, workforce development, dental health education, dental hygiene, public health, healthcare management, health information technology, clinical research, and business. Nearly three-quarter of these respondents chose online graduate programs and four chose institutions outside the state of Michigan.

Respondents reported increased participation (18% to 32%) in a range of public health-related roles including: clinical and administrative positions in Federally Qualified Health Centers (FQHCs), school-based programs, and mobile dental units; professional development for providers in treating vulnerable groups, and advocacy efforts at local and state policy levels. Chi-square test for significance identified a significant increase in respondents' participation in the role of dental hygiene instructor pre and post E-Learning program (6% to 36%, $p = 0.000$).

Key Graduate Outcomes

An open-ended question eliciting perceptions of key outcomes of the E-Learning program was included and 80% (n=40) of the participants responded (Figure 4). Responses were themed into the following categories; leadership / professionalism / networking,

Table II. Respondents pre and post-E-Learning program professional roles (n=50)

Role	2 Years Pre-program				2 Years Post-program				p =
	Time spent in role/week								
	0 hrs/wk	1-16 hrs/wk	17-31 hrs/wk	32+ hrs/wk	0 hrs/wk	1-16 hrs/wk	17-31 hrs/wk	32+ hrs/wk	
Student	20	9	5	16	32	9	6	2	0.011
Clinician	16	7	14	13	8	9	10	23	0.061
Public health	41	6	1	2	34	10	3	3	0.074
Dental hygiene instructor*	47	3	0	0	32	9	6	3	0.000*
Research	46	3	0	1	44	6	0	0	0.504
Administrator	48	1	0	1	43	4	0	3	0.080
Non-oral health	36	7	4	3	40	7	1	2	0.407

* indicates statistically significant changes from before enrollment to after enrollment. ($p < .05$)

expanded career opportunities, increased community involvement, increased self-confidence, advanced education opportunities, evidence-based information/research/practice (EBP), and improved communication skills/publications. Key outcomes in the categories of leadership/professionalism/networking and expanded career opportunities each received approximately one-half (53%) of the responses.

Satisfaction with Online Delivery

Survey items sought to determine the value of the delivery method of the E-Learning program (Figure 5). These questions whether the online delivery option had been beneficial to the graduate’s learning and, if so, why? Respondents were asked to choose all reasons that applied. All respondents indicated that the online delivery option was beneficial to their learning. Most respondents (86%) noted it allowed them to continue working while enrolled in the program. The ability to balance family responsibilities with educational goals (78%), and no need to commute to educational institution (68%) were common responses. In addition, others indicated that it allowed them to attend their preferred university instead of one geographically closer (14%) and identified that while the didactic work was online, there were extensive experiential learning (e.g. service-learning, student teaching) opportunities as well (14%). Recommendations for improving the program included assistance with job placement and additional courses in epidemiology and biostatistics.

Discussion

Outcomes of the study demonstrate that the E-Learning program was effective in meeting its programmatic goals by citing graduate activity in key competency domains two years following program completion. The Leadership/Professional Development and EBP domains were noted by many graduates as areas of increased involvement. However, the Community-Based Practice domain stood out with all respondents indicating a sense of professional responsibility in addressing disparities within their own communities. Nearly all participants stated that they had increased confidence working with vulnerable populations. This strong association with the community-based competencies could have been influenced by the experiential learning activities that took place during the community and capstone courses.

These activities, coupled with frequent self-assessment and critical reflection, may have augmented the students’ growth beyond simple attainment of competence in which they identify transformative changes in their perceptions, confidence, identity, skills, and pride. In the 2012 and 2015 evaluations of the E-Learning program’s first cohorts’ experiences, students indicated significant involvement and achievement with all domains/competencies.^{9,10} Results from the current study show that graduates continue to interact with these domains and report a positive impact on their personal and professional lives.

Figure 4. Key graduate outcomes of E-Learning program (n=38)

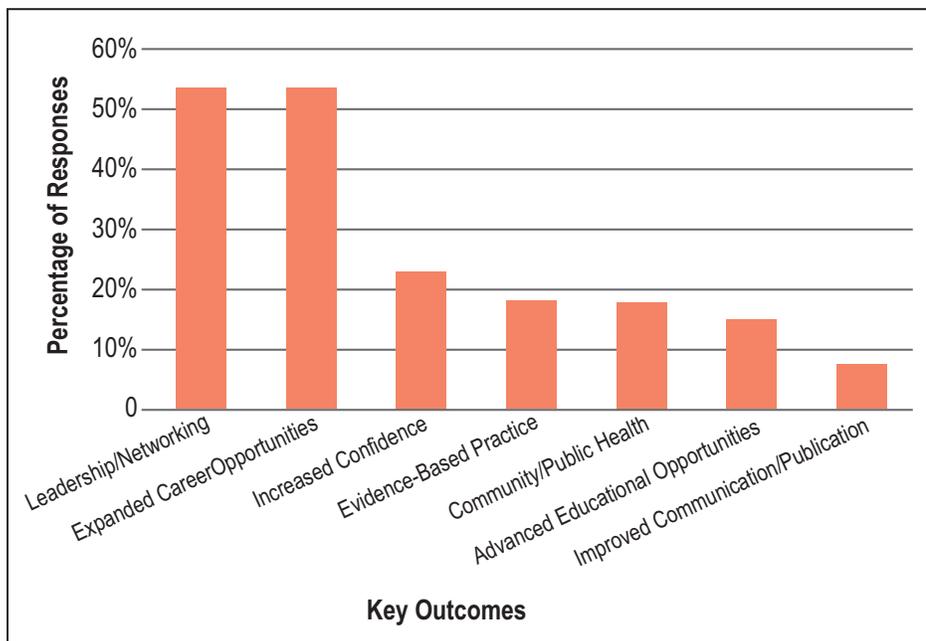
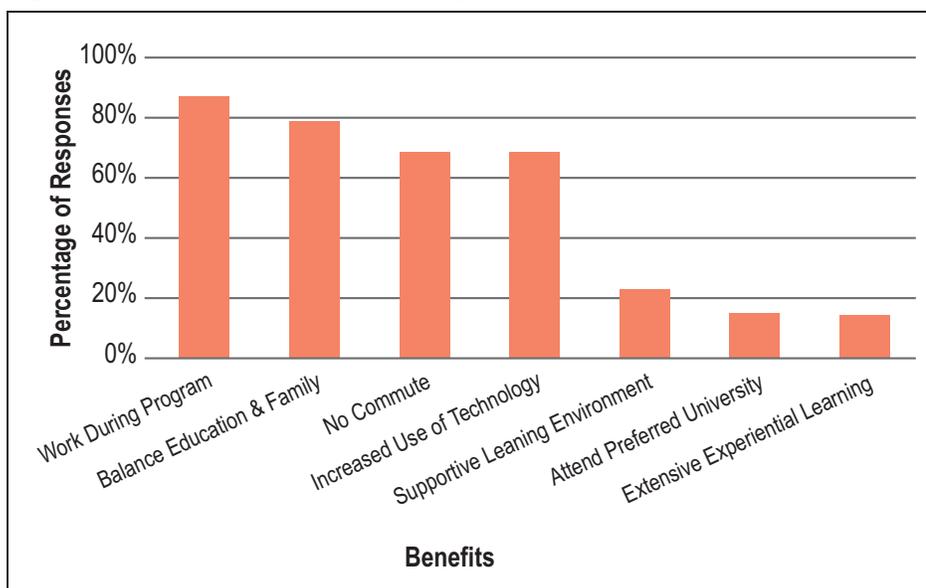


Figure 5. Benefits of online delivery option (n=50)



Effectiveness in Meeting Programmatic Goals

Professional Development and Leadership

Graduates overwhelmingly reported that the program increased their leadership skills and commitment to professional development and lifelong learning. Participant's post-program activities indicated that nearly one-quarter had been successful in securing leadership positions. Additional key graduate outcomes related to professional development and leadership and expanded career opportunities were identified. The UM DH E-Learning Program's dedicated competencies in professional development and leadership and activities have been integrated through multiple courses may have

positively influenced graduate's post-program experiences. These findings align with the Smith et al. study of faculty perspectives on leadership curriculum in degree completion programs, that while stand-alone leadership courses have been thought to offer foundational skills, leadership-infused programs were shown to better prepare graduates for professional leadership roles.¹¹

Within the *Professional Development and Leadership* domain, a majority of graduates indicated an improvement in self-reflective skills. Self-reflection is a life skill allowing individuals to improve their thought processes while critically assessing their experiences.¹² The UM DH E-Learning program incorporated a reflective ePortfolio throughout the program, providing an opportunity for students to reflect on four competencies of their choice at the end of each of the eleven courses. In addition, there were a number of strategically placed reflective assignments throughout individual courses. Allowing students to make connections between learning outcomes (competencies) and experiences fosters learning and knowledge transfer.¹³ The evaluation of the first two cohorts demonstrated that the use of reflection and meta-reflection increased student professional competence and confidence.^{9,12} Results of this study indicate that graduates continue to identify critical self-reflection as a highly used and valued skill.

Evidence-Based Practice

Evidence-based decision making (EBDM) relies on the application of evidence to solve problems to provide the best possible patient care at all levels.¹⁴ Nearly all participants reported that the E-Learning program increased their ability to provide evidence-based, comprehensive patient care, think critically, solve problems, and make decisions. Many respondents also reported continued use

of scholarly databases in and outside of clinical practice. These findings are consistent with the research of Kanji et al. of degree completion dental hygienists who reported a broader and more advanced knowledge base after completing their baccalaureate education.¹⁵ This was reinforced by specific abilities in critical thinking, EBDM, and providing more comprehensive dental hygiene care. Similar to the first two cohorts of the UM DH E-Learning Program and Kanji et al., participants in this study noted that their expanded knowledge base and additional credentials led to more career opportunities such as in education, administration, public health, sales, and graduate degree studies. These outcomes are important in developing professionals who are prepared to meet future health care needs through utilization and integration of research into practice and other professional pursuits.

Community-Based Oral Health

Evolving practice settings have created additional demands for oral health care providers who are able to move outside of private practice to engage patients in community settings. Developing professionals who are prepared and willing to treat and advocate for vulnerable populations is a challenge for educational programs. High quality service-learning experiences have been identified in the literature as having important implications for generating civic minded providers.^{16,17} One way that service-learning differs from volunteering is through the use of reflection allowing for students to explore their evolving moral reasoning, social responsibility, and impact on society. While many studies have demonstrated the positive influence service-learning experiences may have on students' appreciation of community health issues and their own professional responsibilities, there is evidence suggesting that these changes are short-term and do not extend into practice post-graduation.^{18,19}

Integration of service-learning into the UM DH E-Learning curriculum provided students not only with experiential learning opportunities in their home communities, but also the chance to experience meaningful personal and professional growth facilitated by frequent critical incident and competency reflections. When asked two years after graduation about the dental hygienists' role in the community, UM DH E-Learning graduates continued to feel ties to the *Community-based Practice* competencies. Participants reported that the program improved their sense of professional responsibility, confidence to work with vulnerable populations, and helped them see themselves as community oral health advocates. The number of respondents spending time in public health related professional roles two years following graduation increased from pre-program hours suggesting a longer-term impact of these activities on these graduates.

Professional Roles

The positive long-term outcomes of the study speak to the impact of transformative learning on program participants. Positive changes in post-program professional roles most likely indicates that graduates experienced additional career opportunities due to their advanced education. The most significant increase in hours spent in professional roles was in the area of dental hygiene instruction/education. This is encouraging as it represents one of the UM DH E-Learning program competencies of preparing graduates for entry-level teaching positions in dental hygiene programs. In partnership with a dental hygiene program in their community, students participate in a seven-week student teaching practicum during their second year of the program. This competency also supports a workforce need among dental hygiene educational programs for new faculty to replace high numbers of retiring faculty.²⁰ Dental hygiene faculty who are committed to leadership, lifelong learning, and advocacy are indispensable for advancing the profession.

Over one third of the participants in this study indicated pursuing graduate degrees in a variety of disciplines and felt that the UM DH E-Learning degree completion curriculum adequately prepared them for advanced education opportunities. The diversity of majors chosen by graduates may be an indication of growing multidisciplinary demands of dental hygiene and health care in general. The choice to continue advanced education via programs offered online could also suggest that the participants found the online delivery model valuable in balancing personal needs with professional goals. Participation in these professional pursuits two years post graduation plays a significant part in demonstrating longer-term attainment of the UM DH E-Learning programmatic goals of developing leaders in the profession who are prepared for expanded roles in alternative practice settings.

Increased numbers of participants involved in clinical practice roles post-program was likely due to the number of UM DH E-Learning students who had completed their associate degree just prior to enrolling in the program and had not yet worked in clinical practice. The number of participants indicating administrator roles post-program increased from 2 to 7; however, data was not collected on the nature of those roles. Anecdotal data indicates graduates were employed in administrative positions in FQHCs and Michigan's Public Dental Prevention programs, a direct access workforce model.

Value of Online Delivery

The online delivery model was highly valued by the participants. Benefits of online learning identified by

respondents align with the needs of the working professional in accessing higher education or professional development opportunities. Dental hygienists face barriers to attaining their bachelor's degree in terms of access and affordability. Creating realistic educational pathways via part-time enrollment in programs delivered mostly or fully online can remove these barriers and improve upward career mobility. In addition, online learning arrangements facilitate the stability of the oral health care system in allowing practitioners to continue providing oral health care in their home communities rather than "transplanting" them into the communities of the educational institution.

Study Limitations

Limitations include the fairly small total number of graduates from one institution and the self-reported nature of the data collection. Distributing the survey electronically presented challenges related to incorrect or unused alumni email addresses. The survey was the only evaluation instrument used in this study whereas focus groups, such as those used in the initial assessment of the first two cohorts, could have provided useful information.

Conclusion

Results from this study demonstrate online or E-Learning models are a viable delivery option for dental hygiene degree completion programs. Graduates of the online degree completion program reported ongoing activities in key areas of leadership, utilization of evidence-based decision making, increased commitment to community-based oral care needs, and expanded employment opportunities. Study findings also contribute to the growing evidence supporting the baccalaureate degree for entry into the profession in order to effectively prepare dental hygienists with the knowledge, confidence, and values needed to explore diverse and changing professional roles. Additional research is warranted to ensure that degree completion program goals reflect the evolving dental hygiene profession and health care system and that program delivery practices meet the needs of the working professional student.

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2020 ADHA Virtual Conference Poster Presentation Abstracts

The following research poster abstracts were submitted to the Annual Conference of the American Dental Hygienists' Association, held virtually, June 26 – 28, 2020.

Creating Awareness for the Social Determinants of Health: Dental hygiene and nursing student interprofessional service-learning experiences

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Problem: While benefiting the community, service-learning experiences can provide students with opportunities for interprofessional collaboration and growth. Written reflection can be an effective way to assess student perceptions and learning regarding IPEC sub-competencies. In addition to measuring the level of interprofessional learning, themes can be identified from written reflections.

Purpose: The purpose of this study was to evaluate whether a service-learning interprofessional education (IPE) experience with dental hygiene (DH) students and undergraduate nursing students could reinforce learning related to Interprofessional Education Collaborative (IPEC) sub-competencies.

Methods: The DH students were divided into groups of six or seven and were assigned one of five dates for a four-hour health screening session at a designated school with nursing students. Before the activity, DH students were provided with an IPE experience document to help guide group discussion and written reflection. On site, DH students were responsible for conducting oral exams and providing oral hygiene instruction while nursing students were responsible for taking blood pressure, calculating body mass index, and classifying risk for obesity. The DH students completed individual written reflection assignments one week following the activity and the narrative responses were independently analyzed for themes related to the IPEC sub-competencies and for learning beyond the targeted sub-competencies.

Results: Thirty-one senior DH students (n=31) participated in one of the five screening sessions at four local public schools and completed a guided written reflection assignment focused on the following IPEC sub-competencies: 1. Communicate roles and responsibilities clearly to the patient, family, and other health professionals (RR1), 2. Explain the roles and responsibilities of other providers and how the team works

together to provide care, promote health, and prevent disease (RR4), and 3. Describe how professionals in health and other fields can collaborate and integrate clinical care and public health interventions to optimize population health (RR10). Student reflection assignments confirmed that the IPEC sub-competencies were met. Themes from the written reflections indicated that students recognized social barriers related to health and the need for multiple professions to promote health. Several comments reflected the potential formation of negative bias. DH students commented on the difficulty children may have eating healthy foods based on what is served in the school cafeteria; children not being educated about health outside of what is presented in school; children not being active at home due to lack of parenting skills; and children being at risk for obesity related diseases because of lack of finances and/or unstable homes.

Conclusion: Service-learning activities enhance IPE and learning outcomes on the topic of social determinants of health. Group discussion and individual reflection are essential components to consider when designing a service-learning IPE experience. Individual reflection can assist educators in gaining insight to student learning while uncovering other educational concepts to focus on.

Interprofessional Education Self-Efficacy of Dental Hygiene Students: A longitudinal study

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Brandi Carlson, RDH, MS
Barbara Smith, PhD, PT
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Problem: Dental hygienists are integral members of the interprofessional team, having expertise in oral health. Interprofessional education (IPE) events allow dental hygiene (DH) students to participate as an interprofessional team member. Few studies have been reported regarding DH students' perceived self-efficacy in regard to interprofessional competency after multiple exposures to IPE events.

Purpose: The purpose of this study was to measure DH students as well as other health profession students' confidence in their ability to work collaboratively to provide effective care for patients. This preliminary report is from the first of three surveys that will be administered over two years during their professional programs. This initial survey compared baseline data between students of five different health care disciplines.

Methods: The study was approved by the university's IRB (#4514). Students from five different disciplines participated: DH, physician assistant, medical laboratory science, physical therapy, and communication sciences and disorders (n=157). The 27-item Interprofessional Educational Collaborative Competency Self Efficacy Tool was used to gather baseline information on four competencies defined by the Interprofessional Education Collaborative. A 100-point slider bar scale allowed for a continuous rating of each statement. Each statement is evaluated individually. Students were surveyed within the first 2 weeks of entry into their professional program. One-way analysis of variance was used to evaluate differences in statement scores by student program. SPSS V-25 were used to analyze the data. The alpha level was set at 0.05, with the use of Bonferroni's correction as needed.

Results: DH students comprised 15.6% of the group (n=24). They were the youngest (mean age 21.42 (+/-1.6 years)). No significant differences in scores were found between DH students and students from other professions. DH students rated themselves lowest in ability to forge independent relationships with other professionals to improve care (73.2 +/- 25.6%). They rated themselves highest in demonstrating high standards of ethical conduct (87.0 +/- 13.2%).

Conclusion: No differences were found for student perceptions of self-efficacy based on program type at the beginning of their professional programs. Two more rounds will be administered at the beginning and end of students' second year. Analysis of change as the students proceed through their programs should allow DH faculty to discover which, if any, IPE competencies should be strengthened or revised to improve student self-efficacy.

Preliminary evaluation of dental hygiene curriculum: Assessment and management of peri-implant conditions and diseases

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Problem: There is currently no available research on curricula focusing on peri-implant diseases and conditions within DH education programs. Preliminary data is needed to provide a baseline on a national level to identify what is taught in dental hygiene didactic and clinical curricula for the assessment and management of peri-implant conditions and diseases and whether students are adequately prepared to care for implants upon graduation. The data from this study may inform future curricular development.

Purpose: The purpose of this study was to investigate dental hygiene educational programs' didactic and clinical curriculum in the management of peri-implant diseases and conditions. The study had two specific aims 1) assess if evidence-based content for peri-implant diseases and conditions are currently included in didactic and clinical dental hygiene curriculum and 2) determine if dental hygiene education programs are currently preparing students at a level of clinical competency for the assessment and management of peri-implant diseases and conditions.

Methods: A cross-sectional study of dental hygiene faculty member(s) from 331 United States entry-level programs responsible for didactic and clinical curriculum for peri-implant diseases and conditions were surveyed. The survey was disseminated electronically via Qualtricsxm August 2019. There were 90 respondents who initiated the survey from 87 institutions for a response rate of 26%. Data analysis was performed using R version 3.5.2. Fisher's exact test was used to evaluate categorical data. In addition, open response questions were themed by category.

Results: The results showed didactic courses taught dental hygiene students the etiology of peri-mucositis and peri-implantitis (98%), clinical characteristics (98%), and risk factors contributing to these implant diseases (96%). Evaluation methods to determine student level of competency in a didactic setting included quizzes/examinations (98%), case-based examinations (63%), and written essays (6%). Eighty-five percent reported dental hygiene students are not required in

a clinical setting to provide care for patients with peri-implant diseases and conditions.

Conclusions: Study results suggest dental hygiene education programs may need to revise didactic and clinical curriculum to ensure students graduate at a level of clinical competency of peri-implant conditions and diseases. Dental hygiene educational programs should consider requiring clinical patient experiences for the assessment and management of peri-mucositis and peri-implantitis to prepare students for their professional role.

Student Wellness: Stress in Dental Hygiene Programs

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Problem: In professional training, regardless of age, institution or degree, students are precipitously introduced into a new environment with immense challenges. Very little data is available on stress in dental hygiene training.

Purpose: The aim of this study was to gain further understanding of stress in the undergraduate dental hygiene learning environment.

Methods: This study was considered exempt by the University of North Carolina at Chapel Hill Institutional Review Board (IRB19-2646). Inclusion criteria were enrollment in the first or second year of the undergraduate program of dental hygiene (DH) at the Adams School of Dentistry (UNC ASoD) or at one local North Carolina community college (NCCC). Students were provided an anonymous survey through a Qualtrics link during a predetermined classroom time to maximize the opportunity for students to participate in the this voluntary study. The survey included demographic queries, screening for depression (PHQ-9), anxiety (GAD-7) and a modified version of the Medical Outcomes Study Social Support Survey. Clinical cutpoints were used to categorize anxiety and depression as moderately severe to severe or none to moderate. Chi-square and Mantel Haenszel row mean score statistics, depending on the scale of measurement, were used to assess the effect of educational setting on the outcomes. Multivariate logistic regression was used to assess the effect of educational setting, demographics, and social support on the categorized levels of anxiety and depression. Significance level was set at 0.05.

Results: Of the 136 eligible respondents, 100% (n=69) of UNC ASoD students and 90% (n=54) of NCCC students responded.

There were no statistically significant differences between the two educational settings in respect to demographics or personal lifestyles (all $p > 0.05$). There was a statistically significant difference between the two settings in the proportion of students reporting moderately-severe or severe anxiety ($p = 0.007$) with 56% of NCCC and 34.8% at UNC ASoD indicating high anxiety. There was no statistically significant difference in depression ($p = 0.07$). However, 42.6% of all students reported moderately-severe or severe depression. Of all respondents 7.8% reported suicidal ideation in the last 12 months. In the logistic regression, only the educational setting was marginally significantly associated the likelihood of moderately severe/severe anxiety ($p = 0.053$). With an adjusted odds ratio 2:1, students at NCCC were 2 times more likely to report moderately severe/severe anxiety than those at UNC.

Conclusions: The proportion of dental hygiene students enrolled in these programs had substantially higher mental/emotional issues than anticipated.

Active Shooter Preparedness: A Survey of dental hygiene students

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Problem: Active shooter incident rates have risen over the past three decades, with some studies showing that annual rates have doubled. Federal Bureau of Investigation reports show that between 2000 and 2017 there were 250 active shooter incidents—including 15 on college campuses. Current literature is devoid regarding educational institution preparation of dental hygiene students for active shooter incidents.

Purpose: The objective of this pilot project was to examine perceived preparedness, confidence, and awareness of dental hygiene students to handle and respond to active shooter incidents.

Methods: A descriptive survey was electronically distributed to entry-level dental hygiene students (n=68) at one institution. The survey consisted of 23 items to measure preparedness, confidence, and awareness of institutional policies regarding active shooter incidents. Descriptive statistics and Pearson correlations were used for data analysis.

Results: Fifty-seven dental hygiene students completed the survey for a response rate of 84%. Almost half of the participants felt slightly prepared (n=26, 45.6%) to respond appropriately to active shooter incidents in the classroom, and

fifteen participants (26.3%) felt not prepared at all. Nearly half of the participants were slightly confident (n=26, 45.6%) in helping to control the classroom during an active shooter incident and fifteen participants (26.3%) felt not confident at all. More than half of the participants (n=32, 56.1%) were not certain if their institution provided active shooter trainings, and 25 participants (43.8%) were not certain if their institution conducted active shooter drills. Perceived preparedness to appropriately respond to an active shooter in the classroom was significantly, positively correlated with confidence in helping to control classrooms during an active shooter incident ($r(56) = .616, p = .000$). Participants' perceived preparedness to appropriately respond to an active shooter in the lab or clinic setting was also significantly, positively correlated with the assumption that active shooter incidents are taken seriously at their institution ($r(56) = .375, p = .004$).

Conclusions: A general lack of preparedness and a false sense of confidence for active shooter incidents may exist among dental hygiene students. Educational institutions should implement best practices for preparing dental hygiene students for possible active shooter incidents.

Dental Hygienists Knowledge, Attitudes and Practices of Menopause Affecting Oral Health

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Problem: Women transitioning through menopause often have a multitude of physical and psychological changes. Dental hygienists may not have the knowledge of dental implications of the hormonal changes during menopause. The attitudes of dental hygienists in discussing hormonal changes during menopause is not known, and the practices of dental hygienists providing oral health education specific to menopause and oral disease and conditions is also unknown.

Purpose: The purpose of this study was to explore the current knowledge, attitudes, and clinical practices among registered dental hygienists in relation to menopause and oral health.

Methods: A cross-sectional research design with a national convenience sample of dental hygienists (n=290) were recruited through dental hygiene social media sites. The data collection instrument was developed following a KAP model, then validated using a content validity index. The expert panel consisted of medical and dental professionals with knowledge

about menopause and or oral health. The validated survey consisted of 35 questions including the following sections: demographics along with knowledge, attitudes, and clinical practices regarding oral health and menopause. Chi-square tests of independence were used to assess the relationship between demographic variables and survey responses.

Results: A participation rate of 68% (n=290) was calculated based on completed surveys. Dental hygienists who attended an entry-level dental hygiene program with curriculum addressing menopause and oral health and who also agreed they received enough education were less likely to state they never offered this specific education to patients ($p < 0.001$). Attending a CEU course was related to a higher percentage who stated they always offered education ($p < 0.001$). Seventy-seven percent reported their entry-level dental hygiene program did not provide enough education on menopause and oral health to allow them to educate their patients.

Conclusions: Education on the changes during menopause and post-menopause which can affect oral health is lacking in dental hygiene curriculum. Dental hygienists who stated they received education within curriculum were more likely to offer specific education on how menopause can affect oral health. More importantly, dental hygienists who attended a CEU course on menopause affecting oral health stated they always offered patient education on the subject.

Effects of Oral Health Training on Caregivers of Individuals with Developmental Disabilities

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Problem: Caregivers have the unique opportunity to provide oral hygiene care to individuals with developmental disabilities (DD), yet receive limited training in this area.

Purpose: The purpose of this study was to explore the impact of an oral health care training program on caregivers' knowledge of the oral-systemic link and confidence in the provision of oral health care for individuals with DD.

Methods: This study utilized a one-group (previously validated) pre-test/post-test design measuring the impact of an oral health training on licensed caregivers' knowledge, behaviors and confidence in the provision of care to individuals with DD. A

convenience sample comprised of 11 (n=11) licensed caregivers of DD in Wenatchee, Washington participated in a four-hour continuing education (CE) training on oral health care/oral-systemic-link. Eleven (n = 11) participants participated in the training and 24 question pretest. Ten(n =10) completed a 27 question post-test. Quantitative measures using descriptive and inferential statistics to describe demographic data and to analyze pre-test/post-test data was utilized. Although a t-test was run for this study, due to the small size of the sample, reporting the frequency is more meaningful for this study. Data from a Likert scale and open ended questions measured confidence using content analysis to identify common themes. Qualitative data was also collected to assess caregivers' concerns of their client's oral health and assess knowledge of how to report oral health concerns as well as how the training would change their own oral health habits.

Results: A significant improvement was identified in post-test scores compared to pre-test scores measuring confidence, ($p=.025$) (Level of significance $p<.05$). Ninety percent of participants, 10 (n =10) indicated they would take a more active role in providing oral health care to their client and were very confident in evaluating their client's oral health.

Conclusions: This study demonstrated that an educational training program can be an effective strategy for caregivers of individuals with DD to increase knowledge on the oral-systemic-link while also increasing confidence in providing daily oral health care. Thus, demonstrating that oral health services can be provided on a daily basis to individuals with DD and could improve their oral and systemic health.

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Health Care Programs: An approach to improving health outcomes through interprofessional education and practice

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Problem: The oral-systemic link is at the forefront of health-care practices. Professional organizations are recommending modifications to incorporate a collaborative healthcare team approach. The American Dental Hygienists' Association and the Commission on Dental Accreditation have set recommendations for interprofessional collaboration (IPE/IPP) to be an emphasis within dental and dental hygiene educational settings.

A recently released report on this topic stated that "In order to provide quality and cost-effective care, health professionals must be better prepared to lead and collaborate in interprofessional teams."

Purpose: The objective of the study was to understand students' perceptions and attitudes working with other healthcare team members in an IPE/IPP collaborative practice environment. The purpose of the study is to determine if students who participate in IPE/IPP clinical activities have an increase in attitudes and perceptions, communicating, and collaborating with a variety of individuals on the healthcare team.

Methods: A convenience sample of dental hygiene and speech language pathology students (n=99) was used, and a qualitative survey tool was adapted from two validated surveys using a Likert scale. The electronic survey measured student attitudes and perceptions of their profession and understanding of other health discipline roles. An application was submitted to the university's Institutional Review Board to survey the students (IRB# 19873)

Results: Analysis of the IPE/IPP experience showed, 92% (n= 91) of the students strongly agreed that patients would benefit if health sciences students worked together to solve patient problems. Additionally, 86% (n=85) of the students strongly agreed that they respected the unique cultures, values, roles and responsibilities, and expertise of other health professions.

When pre-tested DH students had a lower perception than the SLP student of working closely with individuals in other professions ($p<.001$). Post-test results showed DH student perceptions increased but there was no significant difference between the disciplines. There was a statistical significance between pre-test and post-test in attitudes of students working closely with individuals in other professions ($p<.001$), and attitudes of having good relations with people in other professions ($p<.001$).

Conclusions: Incorporating IPE activities improves understanding and encourages students to embrace collaborative patient care, as well as increase positive overall attitudes and perceptions of interprofessional collaborations. More research is needed looking at patient health outcomes when treated in a collaborative practice environment, including dental hygienists as part of the healthcare team.

State Licensing Board Requirements for Entry into the Dental Hygiene Profession

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Problem: In 2018, the American Dental Hygienists' Association proposed the Commission on Dental Accreditation (CODA) implement changes to the entry-level degree for dental hygiene education, replacing the associate degree with the baccalaureate degree. CODA requested justification for this change and five areas to be addressed. One of these areas included information from state boards regarding current entry into the profession.

Purpose: The purpose of this study was to identify current requirements for licensure and entry into the dental hygiene profession across state licensing boards in the United States.

Methods: A non-experimental study design was used to study dental and dental hygiene board licensing requirements in the United States, District of Columbia, and the Virgin Islands. The website for each regulatory board was searched for licensure by examination to ensure data was collected, specific for entry into the dental hygiene profession by the PI and verified by the co-investigators. Requirements were noted on an Excel spreadsheet. In most cases, the practice act was reviewed to gather further information and verify accuracy. Twenty regulatory boards were also contacted to verify that the information obtained was complete and accurate when website information was unclear. Descriptive statistics were used to analyze data.

Results: Information from a total of 52 dental boards was examined for this study. Almost all boards (n=51, 98.1%), with the exception of Alabama, required completion of entry-level education from a CODA accredited program and successful completion of the National Dental Hygiene Board Examination. Most states (n=51, 98.1%), except Delaware, also required a regional clinical board examination. Application fees ranged from \$47.70 to \$600. States varied considerably in terms of requirements for background checks, age, military status, and infection control training.

Conclusions: Although the majority of regulatory boards require completion of dental hygiene entry-level education from a CODA accredited program and successful completion of national and regional clinical examinations, there is considerable variation in other requirements for licensure among the boards.

Perceived Barriers and Challenges of American Indian/Alaska Native Women Obtaining Dental Care During Pregnancy

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Problem: Pregnancy is a unique time in a woman's life, it is also a time when women are at higher risk of oral disease. In addition, women are also at risk of transferring harmful oral bacteria to young children. A direct, inverse relationship between maternal prenatal access to dental care and the development of early childhood caries (ECC) in American Indian/Alaska Native (AI/AN) communities has been identified. Maternal access to dental care in AI/AN communities has consistently been low; over the past 4 years on average, only 2.8% of AI/AN accessed oral care compared to 49.0% of U.S. pregnant women.

Purpose: The purpose of this study was to explore the perceived barriers and challenges related to maternal oral health in a convenience sample of American Indian/Alaska Native (AI/AN) pregnant women in two Northern Plains Native American communities.

Methods: An interpretive qualitative research design was used to understand, illustrate, and analyze the perceptions and experiences of AI/AN women obtaining dental care during pregnancy. The social ecological model was used as a theoretical framework to understand the complex mix between individual, interpersonal, community, and societal levels that influence one another when navigating health issues. The study consisted of a convenience sample of 32 adult AI/AN pregnant women. A semi-structured interview guide was used in face-to-face interviews. These interviews were recorded, transcribed, and coded with a priori and emergent codes that became themes, where themes ultimately became the story or narrative addressing the purpose of the study. IRB approval was obtained from A.T. Still University and the Indian Health Service Great Plains IRB Board.

Results: Most participants (71.4%) reported time as the most influential barrier to obtaining dental care during pregnancy. Time was followed by fear (25%), lack of pain (6%), misinformation (6%), not a priority (3%), and service (3%). The study revealed there is oral health knowledge, positive maternal oral health attitudes and beliefs, positive influences surrounding maternal oral health, positive OBGYN support in seeking dental care during pregnancy, and an acknowledgement of oral-systemic connections. Additionally, a lack of support or advice from primary care providers regarding maternal oral health was revealed. An overarching theme of low health literacy was also found in this study.

Conclusions: Despite knowledge regarding oral health, oral health behaviors, and oral-systemic connections, behavior choices did not match this knowledge. Future research should further explore closing the gap between low health literacy and behavior choices. Future research should also include exploring and analyzing underlying assumptions or beliefs that might form semantic content regarding a deeper meaning of time.

Effectiveness of an Educational Workshop on Dental Hygiene Students' Competence and Comfort in Treating Transgender Patients

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Problem: Transgender individuals face barriers to health care such as harassment, violence, and the refusal of care. Current literature shows a lack of instruction about caring for sexual minority patients in dental and allied dental education programs, which contributes to the barriers to care for this population.

Purpose: The purpose of this quasi-experimental study was to determine the effectiveness of an educational workshop on dental hygiene student competence and comfort levels in treating transgender patients.

Methods: Dental hygiene students' competence and comfort levels in treating transgender individuals were evaluated using an adapted version of the Assessing Medical Attitudes Toward Transgender Care survey. Primary data was collected from a convenience sample of 45 dental hygiene students who attended an educational workshop about caring for transgender individuals. Data were collected at Week 1 (baseline) and Week 6 (post-workshop).

Results: The Wilcoxon signed-rank test was used to analyze the data. The results showed a statistically significant increase from pretest to posttest in competence (1.6667-3.0000; $z=5.373$) and comfort (3.0000-3.8000; $z=4.799$) scores after attending the educational workshop, $p<.05$.

Conclusions: The findings of this study provide evidence suggesting that education about transgender health care increases competence and comfort levels among dental hygiene students. Educators should consider including this content in dental and allied dental education curricula. When creating and revising dental hygiene curricula, educators and policymakers should ensure this content is included in sufficient scope and depth to prepare graduates to care for this population.

Attitudes, Expectations, Knowledge, and Intentions Regarding Oral Health: Perceptions of Older Adults

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Problem: The advantages of fluoridated water, dental insurance, greater awareness of preventive oral healthcare, and more restorative dental services, have allowed many adults in today's aging cohort to maintain their teeth into their advanced years. The demand for oral healthcare services will be greater and more complex than that of previous generations. Adults transitioning out of the workforce face numerous barriers related to attaining oral care services. Understanding the attitudes, expectations, intentions, and current level of oral and overall health knowledge from the perspective of older adults is vital to helping these individuals transition into increasing levels of dependency with a high level of overall quality of life.

Purpose: The aim of this study was to assess health literacy and access to care, including attitudes and intentions related to dental care utilization, from the perspective of older adults living independently.

Methods: A qualitative thematic analysis guided by behavioral constructs of the Reasoned Action Approach was utilized to develop and conduct semi-structured interviews of a purposeful sample of adults age 65 and older living independently. A demographic questionnaire, followed by one-on-one interviews was conducted by the primary investigator from August of 2018, through January of 2019. Three investigators analyzed the data using coding procedures characteristic of grounded theory.

Results: Participant data ($n=26$) revealed five themes: difficulties accessing dental care; stoic independence; taking care of your mouth as part of overall health; relationships affecting oral health related quality of life; and supporting roles. Overall, the intention to attain dental care was affected by the need to prioritize many health issues over oral care. The findings demonstrate a need to increase oral health literacy in the older adult population with attention to reducing modifiable risk factors associated with dental diseases. An overarching expectation to have affordable basic services available pervaded. Notably, older adults experienced difficulties understanding a complex healthcare system.

Conclusions: The perceptions of participants reflected socioeconomic disparities that could be decreased through interprofessional efforts, health literacy education, dental

professional curriculum focused on better understanding the complexities of the healthcare system, and a reevaluation of policies that limit the ability of dental hygienists to work to the full extent of their scope of practice.

Associations Between Wisconsin Dentists' Use of Silver Diamine Fluoride (SDF) and the Theory of Planned Behavior (TPB)

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Problem: Silver Diamine Fluoride (SDF) is a promising alternative treatment for caries, particularly among low income children, elderly adults, and patients with special needs that interfere with the placement of traditional restorative treatment. However, adoption of SDF into standard dental practice has been slow in the United States and little is known about dentists' perception of SDF in caries management.

Purpose: The purpose of this study was to identify the association, if any, between SDF use among Wisconsin dentists and the Theory of Planned Behavior (TPB) constructs of attitudes, subjective norms, and perceived behavioral control.

Methods: This mixed-methods, cross sectional study used convenience sampling. An electronic survey was sent to 816 active licensed Wisconsin dentists with valid email addresses provided email by the WI Department of Safety & Professional Services. Since no existing studies investigate SDF within the framework of the Theory of Planned Behavior, a TPB index was created to quantify the three constructs, with higher scores indicating greater positivity toward SDF. While the index has not yet been validated, Cronbach's alpha coefficient of 0.83 indicated good internal consistency. Chi-square tests were used to analyze categorical data, and 2-sample t-tests were used to compare means. Alpha level was established at $p < 0.05$. Qualitative comments were independently coded by two researchers as representative of attitudes, subjective norms, or perceived behavioral control. Comments were also coded as positive, negative, or neutral in regard to SDF. Data triangulation was accomplished by categorizing each code by the respondent's TPB index score and sub scores.

Results: The response rate for the study was 10% ($n=80$) with 55% reporting SDF use. SDF users had statistically significantly higher mean TPB index scores compared to those of non-users ($p < 0.001$). These findings were consistent for all three TPB constructs as SDF users had higher mean attitude scores ($p < 0.001$), perceived behavioral control scores

($p < 0.001$) and subjective norms scores ($p = 0.003$) than non-users. Most respondents (74%) provided qualitative responses. Triangulation of qualitative and quantitative results strengthened the finding that higher TPB index scores correlated with SDF-use. One additional qualitative code revealed interest in continuing education about SDF among non-users.

Conclusions: More than half of study participants reported SDF use. Both quantitative and qualitative results were consistent with the premises of TPB, since attitudes, perceived behavioral control, and subjective norms were associated with the behavior of SDF use, both individually and cumulatively. Qualitative data also revealed that participating Wisconsin dentists desire further education about exactly when and how to use this product in their practices. Therefore, additional educational efforts are required to ensure consistency in information and to make current, evidence-based practice guidelines easily accessible.

Social Media Usage by Dental Hygiene Educators

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Problem: Contemporary students expect technology to be used in the classroom to enhance educational experiences. The utilization of social media as an educational tool in the dental hygiene classroom is an integral part of the classroom of the future. There may be a disconnect between our millennial learners and our seasoned dental hygiene educators when it comes to social media engagement. In order to implement new technology strategies, it is vital to understand current social media use by dental hygiene educators.

Purpose: The purpose of this study was to describe how dental hygiene faculty engage in social media for personal, professional, and educational use.

Methods: The researchers developed a twenty-five-question survey instrument to investigate the use of social media by dental hygiene educators. The survey included demographic data; the personal, professional and educational use of twelve common social media sites and belief questions about social media. An email with an attached, validated Qualtrics survey was sent to 379 dental hygiene program directors in the United States and Canada with the request to disseminate to their faculty.

Results: A total of 120 responses were analyzed. While Facebook was the most utilized site for personal use (78.3%), LinkedIn was the most frequently accessed site for professional use (57.5%), and YouTube for educational use (68.3%). There was strong agreement that the interactive nature of online technologies create better learning environments (n = 101, 84.1%). There was also strong agreement that social media use in the classroom invites student participation (n=93, 77.5%). Respondents reported that the lack of time was the major barrier to their integration of social media technologies in the classroom (n=63, 52.5%).

Conclusions: A large majority of dental hygiene faculty use social media personally and professionally. Conversely, social media is underutilized in the dental hygiene classroom, if video sharing websites are excluded. This study demonstrates that within the dental hygiene classroom, there is ample opportunity for growth of engagement with social media.

Electronic Nicotine Delivery Systems Education in US Dental Hygiene Programs: Results of a national survey

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Problem: Electronic nicotine delivery systems (ENDS) are rising in popularity and carry considerable health risks. Dental professionals should be competent to assist patients with smoking cessation including ENDS, yet there is no standardized smoking cessation education in US dental hygiene education programs.

Purpose: The study aimed to assess what content is included in US dental hygiene education programs' curricula about the harms and risks of ENDS, the use of ENDS as a smoking cessation aid, how ENDS could serve as a gateway to other tobacco use, the impact of ENDS on systemic and oral health, program directors' attitudes about the importance of ENDS to their programs' curricula, and barriers to incorporating ENDS content.

Methods: A cross-sectional study of all 332 US dental hygiene education program directors obtained from the American Dental Hygienists' Association website was con-

ducted in July 2018. A 25-question survey was developed, reviewed by the University of Michigan Survey Research Center, pilot tested, and distributed electronically. Descriptive statistics and one-way ANOVAs were used to evaluate the extent of inclusion of ENDS in curricula and variations between regions and program types.

Results: A total of 141 surveys that broadly represented US dental hygiene education programs were completed for a response rate of 42%. Eighty-five percent of programs reported including smoking cessation education about ENDS. Directors had variable attitudes about teaching ENDS as a cessation modality. For example, 24% thought it was "extremely" important to teach ENDS for tobacco replacement while 23% thought it "not at all" important. By contrast, 94% thought it was "very" or "extremely" important to teach students about the harmful effects of ENDS and how to assist quit attempts. Despite nearly all agreeing that graduates should have ENDS knowledge, over half of programs cited a lack of faculty knowledge and confidence about teaching ENDS as barriers to incorporating it. To assess students' knowledge, respondents reported utilizing clinical competency testing (41%), objective standardized clinical examination (13%), proficiencies (30%), research papers (19%), standardized patient interviews (30%), and written tests (74%). The amount of time dedicated to smoking cessation education varied from 0 hours to over 30.

Conclusions: The majority of dental hygiene education programs in the US include ENDS content in their smoking cessation education. However, they lack standardized course content and faculty training regarding ENDS. The inclusion of ENDS in educational programs should be carefully evaluated due to the need for additional research on ENDS and its potential smoking cessation benefit versus the harmful effects.

Perceived Pain During the Injections of Maxillary Lateral Incisors Using the Dentapen Electronic Syringe

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Problem: When patients express fear and anxiety about dentistry, one main source involves the administration of local anesthetic. Limited evidence exists regarding whether a Computer-Controlled Local Anesthetic Device-CCLAD (Dentapen, Septodont; Lancaster, PA) can reduce pain associated with dental injections by regulating the depostion rate.

Purpose: The purpose of this study was to evaluate for differences in perceived pain during the administration of local anesthesia of the maxillary lateral incisors using the ramp-up and continuous modes of a CCLAD.

Methods: Upon IRB approval, this study utilized a randomized, controlled, double-blinded, crossover, experimental design. Investigators randomly assigned the order of the teeth (tooth #7 or #10) and the 2 modes (continuous or ramp-up). Participants completed the Corah's dental anxiety scale at each visit and were injected on 2 separate visits at least 2 weeks apart. After each injection, participants rated their perceived pain using a Heft-Parker 180mm visual analogue scale (VAS) at needle insertion, needle placement, and deposition. Repeated-measures ANOVA was used to determine differences in perceived pain between the 2 modes.

Results: Data from 116 participants were analyzed. The perceived pain at deposition with the ramp-up mode ($M=51.98$, $sd=30.04$) was less than the continuous mode ($M=59.98$, $sd=36.28$), although not statistically significant ($F(1,230)=2.569$, $p=.063$). Clinically, the perceived pain with the ramp-up mode was in the mild range (54mm).

Conclusions: Although not significantly significant, the perceived pain with the ramp-up mode was less than the perceived pain with the continuous mode. Further research should evaluate whether the ramp-up mode could be used to reduce the pain perceived with other dental injections.

Dental Hygiene and Nursing Students' Perceptions of Interprofessional Collaboration

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Problem: Research demonstrates the importance of oral care to reduce ventilator-associated pneumonia. This serves as an opportunity to incorporate oral health into interprofessional education (IPE). Focusing on preventive health through oral care in IPE activities may improve patient outcomes, decrease medical costs, and improve the health of the population.

Purpose: The purpose of this study was to evaluate the effect of a simulation activity on dental hygiene and nursing students' attitudes regarding interprofessional collaboration.

Methods: This study used a quasi-experimental survey design. A convenience sample of dental hygiene students ($n=35$) and nursing students ($n=45$) completed a simulation activity. In response to an email soliciting participation, 28 students completed the pre- and post-surveys. The IPEC Competency Self-Assessment Version 3 Tool was used to measure attitudes regarding interprofessional collaboration. The instrument is a 16-item Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale is comprised of two domains: Interprofessional Interaction Domain and Interprofessional

Values Domain. Data were analyzed in SPSS software. Median IPEC survey scores and interquartile ranges for each domain were calculated.

Results: Significance was set at $p<0.05$. A Wilcoxon signed-rank test showed that there was a significant difference ($Z=-3.447$, $p<.001$) between pre- and postsurvey Interprofessional Interaction scores and no significance was shown pre- to postsurvey in the Interprofessional Values Domain ($Z=-2.374$, $p<0.18$). Median scores between the pre-and postsurvey showed improvement. In addition to the post-survey Likert scale questions, students were asked to respond to open-ended questions regarding the simulation activity and shared noteworthy responses.

Conclusion: This study suggests IPE improves students' attitudes regarding collaboration. Attitudes influence behaviors and it is beneficial to gain an understanding of students' perceptions to strengthen the collaborative spirit once they are in practice.

Early Childhood Oral Health Training Program (EChOTrain): Pilot curriculum evaluation – a professional innovation

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Purpose: This program was designed to train prelicensure dental hygiene students to provide preventive and restorative care to children 0-5 years of age.

Significance: Dental caries remains the most common chronic disease of childhood, with 23% of children aged 2-5 years having dental caries in primary teeth and children from poor or minority backgrounds disproportionately impacted. Training prelicensure dental hygiene students in the care of 0-5 year old children has the potential to help address access to care for this vulnerable population. Studies show that lack of exposure to very young children during the educational process results in a reluctance to provide care to this age group. In Washington State prelicensure programs require training in restorative functions. However, a survey of programs in the state revealed that children under 6 years of age are rarely seen for preventive or restorative care.

Key features: Four dental hygiene students from a local community college participated one day/week for 10 weeks in the EChOTrain pilot. Curriculum was delivered at the University of Washington Pediatric Dentistry teaching clinic. A knowledge/experience/comfort level assessment was

administered prior to the program and at the conclusion. Targeted didactic instruction and lab practice prepared students for the clinical care they delivered same-day in a team-based setting: knee-to-knee toothbrush and rubber-cup prophies, behavior and anticipatory guidance, local anesthesia, nitrous oxide, and placement of composite and glass ionomer restorations. Students were introduced to the concept of the social determinants of health in the context of the epidemiology of early childhood caries.

Evaluation: Pre-assessment of students' knowledge/experience/comfort level revealed no knowledge of behavior or anticipatory guidance and no experience with knee-to-knee positioning, restorative procedures on children 5 years of age and younger, or glass ionomer restorative materials. Only 1 of 4 had any experience caring for children with special needs. Post-assessment all four students expressed significantly increased comfort levels (very confident/somewhat confident) in providing knee-to-knee care, anticipatory guidance, and restorative treatment, including local anesthetic administration, for children 5 years of age and under. All felt ready to provide independent care to a child age 0-5 and benefited from observing care of children with autism. The EChOTrain pilot demonstrated effectiveness in increasing student knowledge and comfort in caring for 0-5 year olds through didactic and experiential learning. The number of students and dental hygiene programs offered the training has now been expanded.

Interdental Removal of Simulated Plaque with an Expanding Black Mint Dental Floss Compared to Traditional Floss

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Problem: Studies show dental floss removes up to 80% of plaque from interdental areas, including plaque and food debris left behind by toothbrushing. Efficacy varies among types of floss products. An established ex-vivo model (Lang et al. BMC Oral Health 2014) examined interdental plaque removal efficacy of two floss products, multifilament floss compared to a new expanding textured floss.

Purpose: The purpose of this study was to assess plaque removal of an expanding charcoal-infused floss compared to unwaxed floss, based on a lab model.

Methods: Using simulated organic plaque and computer-assisted planimetric assessment, plaque removal efficacy was evaluated at 12 interdental coronal and root surfaces by BURST Expanding Black Mint Eucalyptus Floss [BEF (BURST, USA)] and by Oral-B® Glide Pro-Health Original Floss [OBGF (Procter & Gamble, USA)]. Typodonts with 10 artificial teeth were dipped into red-disclosed artificial plaque solution. Plaque was allowed to dry; a single technician flossed the teeth in the model, passing three manual strokes per interdental tooth space through the contact point; one straight perpendicular, two angled 25° mesially-distally, representing c-shape standard flossing action. This procedure was performed seven times for each floss product on different typodonts. Percentage of plaque removal was documented and analyzed for mesial and distal coronal tooth surfaces (above and below contact point, at contact point), mesial, distal, buccal and lingual approximal surfaces (scored similar to D-F sites of Rustogi- Modified-Navy Plaque Index), mesial and distal root surfaces just below the cementoenamel junction. Data were analyzed by independent, two-sample t-test of the mean percent plaque removal, $\alpha=0.05$.

Results: Based on planimetric analysis of plaque removal, both floss products performed well in removing plaque from the interdental areas. Compared to OBGF, BEF exhibited the best plaque removal efficacy with up to 85% removal between teeth (contact areas), $p<0.001$; OBGF Glide removed up to 71%. For root surfaces just below the CEJ, BEF reduced plaque up to 58% compared to OBGF which reduced 23% from the same surfaces, $p<0.001$.

Conclusions: This ex-vivo study demonstrated the potential of two floss products to remove plaque from interdental areas that are not reached with toothbrushing. The interdental planimetric plaque control was superior for BURST Expanding Black Mint Eucalyptus Floss compared to Oral-B Glide Pro-Health Original Floss. Results should be confirmed in clinical trials.

SBIRT training in a dental hygiene curriculum: Evaluation of student satisfaction and confidence

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Problem: Dental professionals are a resource for identifying harmful substance use and increasing access to treatment due to the frequent visits made by patients. The extent of screening and referral by dental professionals is not well documented. This study was designed to assess the impact of Screening, Brief Intervention, and Referral to Treatment (SBIRT), a comprehensive public health approach, in the dental hygiene curriculum as a means for providing students training and confidence in initiating substance abuse conversations with patients.

Purpose: The purpose of this study was to evaluate students' satisfaction and confidence in discussing substance abuse following a public health approach using SBIRT by:

- Introducing dental hygiene students to an effective method for discussing substance abuse and early intervention.
- Developing skills in dental hygiene students to improve content knowledge and practice with an evidence-based strategy to screen for substance abuse
- Empowering practicing dental hygienists to apply what they learned in their training to their professional practice.

Methods: A cohort of dental hygiene students (n=43) consented to participate in a study to evaluate the SBIRT training. Training and assessment was conducted over a two year period with first year to second year students. Thirty-two (32) participants completed the surveys through post graduation. The students were all female, and 94% were white and the remaining were equally divided between African American, Asian and Hispanic/Latino. Nearly half (47%) of the students reported no prior substance abuse training, while 53% reported no prior motivational interviewing training. The curriculum included two hour lecture on SBIRT and tobacco use in spring semester of first year, with role playing and one clinical assignment with a reflective writing. Fall semester second year, included another two hour lecture focusing on alcohol and substance abuse. Activities included case studies, seeing all patients in clinic and reflective

writings. SBIRT encounter forms and visual aids such as the 'readiness ruler' were developed to aid the students in creating brief intervention discussion points. Five measures were used to assess students knowledge of SBIRT strategies (pre- and post-test) and satisfaction (baseline and 30 day follow-up) and a twelve month survey to learn if students added SBIRT into their professional practice. Descriptive statistics and pre and post paired t-tests were used to assess data.

Results: Thirty two of the dental hygiene students completed the study from pre test to post graduation surveys. There was a statistically significant gain ($p < .05$) in SBIRT training knowledge from pre and post-test. The majority of the students (94%) were either satisfied or very satisfied with the training at post survey. Additionally, satisfaction rates increased more at the 30 day post survey. Usefulness of the training increased significantly ($p < .05$) from baseline of 94% to 30 day follow-up of 97%. Finally, 79% of the students at 12 month follow-up indicated they had performed components of SBIRT with one or more patients in their clinical practice, with only 18% indicating they were employed in a practice that conducts universal screenings.

Conclusions: Results from this study show that dental hygiene students gained new knowledge in screening patients for tobacco/alcohol use and were satisfied with the training received. Participants also showed a commitment to conducting SBIRT beyond the school setting by the evidence of use in clinical practice. Improvements in the curriculum will include additional practice in the classroom and preclinical setting to increase comfort level of students, expanding access of training to clinical faculty, and identify additional resources of pharmacological management to treat withdrawal symptoms.

Attitudes Regarding the Effects of Marijuana and Legalization of Medical and Recreational Marijuana in Illinois

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Problem: Marijuana sales in the state of Illinois have multiplied substantially since its legalization in January of 2020. Understanding adults' perspectives allows for discovery of attitudes between different age groups within the adult population in Illinois. There is very limited research showing adults' perspectives of the use of marijuana and if there is an oral or systemic effect within the body.

Purpose: The purpose of this research is to investigate the attitudes of adults regarding the overall health effects of marijuana and their attitudes regarding the legalization of marijuana for medical and recreational use.

Methods: This quantitative, cross-sectional study evaluated the knowledge of adults age 18 and older and analyzed the differences among males' and females' beliefs of medical and recreational marijuana. Convenience sampling was used to select participants. The pilot test consisted of patients in the advanced periodontics clinic at a dental hygiene school in southern Illinois (n=109). A 28-item electronic survey was developed to compile data collection that consisted of demographic and polar questions. Statistical significance was set at $p < 0.05$. The study was determined exempt by Southern Illinois University Carbondale's Human Subjects Committee, protocol number 19167. All participants provided informed consent as part of the clinic informed consent procedure.

Results: A response rate of 23.39% (466 total patients) was achieved. Demographic data indicated 38% of participants were male (n=42), 55% were female (n=60), and 7% prefer not to answer (n=7). Results for all respondents reported the following: 36% believe marijuana is less harmful than alcohol and 44.86% believe it is less harmful than tobacco products. In relation to marijuana's effect on the oral cavity, males (43.75%) and females (46.15%) agree it has a negative effect by causing cancerous lesions, causing decreased salivary flow and increase in caries.

Both groups agreed with the legalization of marijuana in Illinois, predominately males (n=68). There was much uncertainty among the male population if it is safer than pain medicine (66.67%) or alcohol (66.67%), although females thought it was safer than pain medicine (50%) and alcohol (50%). Overall, less than 1/3 of participants have considered its use for medicinal purposes.

Conclusions: The majority of participants were unaware of marijuana's effects on the oral cavity as well as its safety in relation to other products. Some patients felt that marijuana may be a safer alternative than tobacco and alcohol products. In the future, marijuana could be uniformly accepted as a positive benefit for pain control. More research should be conducted on the effects of marijuana in relation to total wellness. In addition, performing a comparative study to see how other residents of other states would be beneficial to determine if certain trends or attitudes exist.

Utilization of Active Learning Pedagogies Improve Critical Thinking Skills Development for Dental Hygiene Students

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Problem: Professional organizations and governmental agencies report there is a need to prepare dental hygiene students for non-traditional and highly autonomous roles in clinical practice. Students must be able to think critically about patient care overall. Novel pedagogical strategies such as flipped lectures, peer-led learning, and case-based learning are common in predoctoral dental education programs to prepare dental students for autonomous decision-making in clinical practice. The literature lacks evidence for use of these practices in dental hygiene education.

Purpose: This study was designed to address dental hygiene student self-confidence in the clinic towards preparation to non-traditional and autonomous clinical roles. Classroom instruction was modified from a traditional lecture based instructional method towards a student-centered model, where lectures were flipped to be online, and in-class work consisted of case studies led by fellow students. All three student centered pedagogies are common in predoctoral dental education, and it is common to find them integrated together. This study was designed to add to the body of research for innovative student-centered pedagogical methods in dental hygiene education.

Methods: Data from three cycles of senior dental hygiene students (n=53) were compiled and summarized using descriptive statistics. This was a mixed-methods study including both quantitative Likert scale questions, and an open-ended summary question to collect qualitative results. Quantitative data was compared using ANOVA with post hoc pairwise comparisons to determine specific differences among cohorts. All post hoc pairwise comparisons were adjusted for using Tukey's adjustment. Significance level was 0.05.

Results: There was a significant change in agreement for the statements regarding whether the student enjoyed learning in this method (p -value=0.0204), the increased amount of work in this format (p -value=0.0435), the small group discussion allowed more freedom to ask questions (p -value=0.0257), and the case study presentations helping students think critically regarding the impact of systemic

disease on dental treatment p -value=0.0004). There were also marginally significant changes in the flipped-classroom helping the students have greater mastery of the content than lecture alone (p -value=0.0531). These results show that this model of peer-led learning dramatically improved in-class engagement and made case-based learning more interactive. The learning methodology created engaged classroom sessions for dental hygiene students, leading to self-reported increased understanding of their role in treating medically compromised patients in the clinical setting.

Conclusions: Student centered pedagogical methods are common educational strategies in dental, healthcare, and science education. Introducing teaching practices such as peer-led learning, flipped lectures, and case-based education to dental hygiene education has significantly positive outcomes for students' self-confidence in clinical dental practice, towards outcomes of increased patient safety and patient care. Incorporating critical thinking skills development by moving lecture out of the classroom with flipped lectures, and then asking students to prepare and deliver case studies to their peers, can help students become stronger clinicians.

Workplace Bullying: A survey of dental hygienists

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Problem: Workplace bullying is a worldwide problem in healthcare impacting career satisfaction, work productivity and mental and physical health.

Purpose: The purpose of this study was to determine the prevalence of workplace bullying in a convenience sample of dental hygienists and compare years practiced and employment setting to prevalence rates.

Methods: A descriptive survey design was used to determine the extent to which 1200 dental hygienists, sampled from a publishing company subscription list, experienced workplace bullying. The 22-item Negative Acts Questionnaire-Revised (NAQ-R), was used to determine how frequently participants experienced various negative acts that typify bullying. Participants were asked to rate the frequency they experienced each negative behavior using a five-point scale (never, now and then, monthly, weekly or daily) in the workplace within the past six months. Participants were also asked to respond to five demographic questions. Data were collected via three electronic

mailings over six weeks and analyzed for response frequency with descriptive statistics. Two-tailed t -tests were used to determine if significant differences in bullying scores occurred between group or solo practice settings and if years of experience affected results. Significance was set at the .05 level.

Results: An overall response rate of 12.5% ($n=154$) was obtained. Data reveal 28% ($n=44$) of participants met the criteria for being bullied, as defined by the NAQ-R. Of this number, three or more negative acts were experienced by 22% of participants at least weekly and six percent of participants experienced two negative acts. No significant differences were found when comparing bullying scores of participants employed in solo practices versus group dental practices ($p=.11$). Results revealed participants with 11 to 19 years of employment experienced bullying less ($p=.02$) and those with 5 to 10 years of practice employment experienced bullying more ($p=.05$) than all other participants. Most participants (77%) reported no written bullying policy existed in their work setting or they were unaware of such a policy.

Conclusions: Results of this study suggest almost one out of four dental hygiene participants experienced workplace bullying. Findings underscore the need for more research with a larger sample of dental hygienists to evaluate the impact of bullying in the oral care practice setting and what strategies and policies work best to eliminate bullying behaviors.

Investigation into the Cultural Competency of Dental Hygienists in a Large Western State of the United States of America

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Problem: The profession of dental hygiene lacks diversity, a contributing factor to cultural competence (CC), an essential component of optimum patient care. When considering the importance of CC to patient care and the roles of the dental hygienist as prevention and health promotion specialists, while educational standards require graduates be competent in diverse patient care, several circumstances support the need for more information: limited practitioner diversity, limited available evidence of actual practitioner CC, and no universal post-graduation CC continuing education requirements.

Purpose: The purpose of the study was to determine the level of CC of registered dental hygienists (RDHs), licensed in a large western state and explore the relationship with provider education, and time and type of provider experience.

Methods: An online survey using a modified version of the Cultural Competency Assessment (CCA), including 25 Likert scale and 7 demographic questions, was distributed to 3231 licensed RDHs using the state's DOPL email list. Non-respondents were contacted twice over a four-week period. Participants were also recruited in person at a local dental conference. Multiple regression was used to analyze associations between CC and salient participant characteristics. The minimal number of required respondents was determined to be 92 for medium effect size ($f^2=0.15$), alpha 0.05, power 0.80, and 647 with small effect size ($f^2=0.02$), alpha 0.05 and power 0.80.

Results: Complete responses from 673 of 3231 RDHs contacted were analyzed, a 20% response rate. The mean CC score was found to be 10.153 (SD=1.3), indicating moderate CC, unequally distributed between cultural awareness and sensitivity (CSA) and culturally competent behavior (CCB) scores. Possessing a graduate degree, CC education during dental hygiene school, CC continuing education, and type of experience, specifically employment in public health, significantly predicted CC, whereas possessing a bachelor's or associate's degree and length of time of provider experience did not. The regression model was significant $F(8,664)=8.616$, $p<0.0005$ with a low effect size ($R^2=0.094$).

Conclusions: Although participants exhibited moderate overall CC disconnect in translating CSA into CCB was revealed, possibly reinforced by environments lacking diversity, with limited opportunity to exercise such behaviors. Education and type of experience were found to be predictors of CC; however, specific educational interventions, that may increase the different components of CC, were not determined.

Ergonomic and Functional Evaluation of Four Dental Prophylaxis Handpieces

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Problem: There exists a strong impetus to improve the ergonomic properties of dental instruments and devices, which can be associated with repetitive stress injuries and musculoskeletal disorders that are common in dental professionals. However, no comprehensive methods exist for quantifying non-invasively, in vivo and in real time the ergonomics and efficacy of clinical dental instruments.

Purpose: The purpose of this study was to compare ergonomic and coronal polishing performance of 4 prophylaxis handpieces using novel surface Electromyography (sEMG) and image analysis techniques.

Methods: Wireless EMG electrodes (Freeemg™, BTS Engineering) recorded activity in 4 hand and arm muscles during standardized baseline activity and coronal polishing in 10 volunteer dental hygienists. Using typodont models sprayed with artificial biofilm and attached to a dental chair, Subjects polished each quadrant for 15s. Participants were filmed, and photographs documented biofilm removal. Next, additional time needed to complete polishing the entire typodont was recorded. Visual analog scale (VAS) measures of comfort and fatigue in hand, wrist, finger, palm and arm were noted. Participants rested 20 minutes between the 4 study arms, each of which tested a different, masked handpiece: (1) Premier Dental AeroPro™, (2) Dentsply Sirona Nupro Freedom™ cordless without foot pedal, (3) Dentsply Sirona Nupro Freedom™ with foot pedal, (4) Ultradent™ corded. Testing sequence was randomized. VAS evaluations of comfort and fatigue (scale 0-10); polishing efficacy (surface area; ImageJ software) and speed; muscle work (EMG analyzer software™); and postural quantification (scale 0-1; ImageMeasurement software™) measures were compared for each handpiece.

Statistical analysis was performed using analysis of variance with repeated measures. Significant findings were followed up with pairwise comparisons using the Tukey method to adjust for multiple comparisons.

Results: AeroPro™ cleaned significantly more surfaces in 60s than Nupro™ without foot control and Ultradent™ ($p < 0.05$), and it cleaned the entire typodont significantly faster than the other handpieces ($p < 0.05$). Participants reported significantly less fatigue and better comfort after using AeroPro™ than all other handpieces ($p < 0.05$). During the first 60s of polishing, Ultradent™ used significantly less work than the other handpieces for the dorsal interosseous muscle, Nupro™ with foot control used significantly less work for the flexor pollicis longus, and AeroPro™ used less muscle work in the abductor pollicis brevis and extensor digitorum communis (significant for abductor pollicis brevis $p < 0.05$). AeroPro™ used significantly less total muscle work over the entire polishing period ($p < 0.05$). All handpieces performed equally for ergonomic forearm position, but AeroPro™ performed significantly better for back, neck and torso posture ($p < 0.05$).

Conclusions: Using novel sEMG and image analysis techniques in a simulated clinical environment, it was determined that coronal polishing with AeroPro™ was accomplished faster with less operator fatigue, muscle work, and postural discomfort.

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Interprofessional Healthcare Delivery: Perceptions of oral health care Integration in a federally qualified health center

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Problem: Traditionally, medical care and dental care have operated separately within the United States healthcare system; each entity has functioned within their own practice, limiting the patient's options for intercollaborative healthcare. Though interprofessional healthcare collaboration (IPHC) is the recommended model for healthcare delivery, a separation between the delivery of oral healthcare and medical healthcare exists.

Purpose: This qualitative ethnographic case study examined a team of interprofessional healthcare providers' perceptions of how oral healthcare was integrated within a federally qualified health center (FQHC) in Brighton Colorado.

Methods: Data were gathered through one-on-one semi-structured personal interviews, which were recorded and professionally transcribed for evaluation. Purposive sampling included physicians, physician assistants, dentists, and dental hygienists. Descriptive analysis was used to describe sample demographics. An inductive and deductive approach was employed to assess the qualitative data and subsequently develop themes. Validity was established using triangulation, member checks, and peer review of data and themes by co-investigators.

Results: Eight participants (n=8) were interviewed. Subjects were between the ages of 31 and 58 and had been practicing between 5 and 30 years with an average of 13.6 years. Participants had been employed by the FQHC an average of 6.8 years. Thematic analysis revealed seven themes which included: interprofessional collaboration supports patient care, immediate consultations lead to improved outcomes for all, shared expertise to optimize care delivery, oral health is health, increased communication through collocation, role clarity does not impede team functioning, and mission driven to provide excellent care. These themes support the domains of patient centred care, communication, and role clarity of the Interprofessional Care Competency Framework and Team Assessment Toolkit (ICCFTAT).

Conclusions: The findings from this study can aid other FQHC's in the implementation of oral healthcare integration. Further research is necessary to understand how interprofessional healthcare collaboration (IPHC) affects the team dynamic.

Sleep apnea screening knowledge, attitudes, and confidence among Ohio dental hygienists

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Problem: Obstructive sleep apnea (OSA) is a common disorder that can increase the risk of systemic and oral complications if left untreated. Dental professionals are in a position to identify symptoms and risk factors of OSA and refer patients for evaluation and treatment of OSA. Not all dental professionals may have the knowledge or confidence to screen patients for OSA.

Purpose: The purpose of this study is to determine the knowledge, attitudes, and confidence levels of Ohio dental hygienists in performing sleep apnea screenings.

Methods: Upon IRB approval, a cross-sectional survey research study was conducted. The sample included all registered dental hygienists in Ohio above 18 years old with an active license with the Ohio State Dental Board. There was a 2.68% response rate (n=228). The sleep apnea questions were from the Obstructive Sleep Apnea Knowledge and Attitudes (OSAKA) questionnaire. The survey instrument was composed of 29 questions: 6 demographic and 23 sleep apnea questions. The 23 sleep apnea questions were divided into 3 groups: 18 questions on sleep apnea knowledge, 2 question on sleep apnea attitudes, and 3 questions on sleep apnea confidence levels. The knowledge questions had the following response options: True, False, Don't Know. The attitude and confidence level questions used a Likert scale for the responses. Descriptive statistics and linear regression analysis were used to analyze the data.

Results: Correlational analysis was conducted to identify relationships between OSA knowledge, OSA importance, OSA confidence and demographic characteristics. OSA knowledge was moderately correlated with OSA importance ($r=.405$, $p<.01$) and OSA confidence ($r=.528$, $p<.01$). This indicated that the more knowledge of OSA dental hygienist have, the more important and confident they feel in identifying patients with OSA. OSA importance was moderately correlated with OSA confidence ($r=.390$, $p<.01$). When a dental hygienist recognizes the importance of identifying patients at risk for OSA their confidence levels in identifying these patients is higher. OSA confidence was slightly correlated with age ($r=-.146$, $p<.05$) and years in practice ($r=-.167$, $p<.05$). This demonstrates that confidence levels decreased with an increase in age and years in practice. Significant multiple linear regression equations to predict OSA knowledge, importance, and confidence were found using the other qualifiers and demographic variables.

Conclusions: As age and number of years practicing as a dental hygienist increases, confidence levels of identifying patients with risk factors for OSA decreases. Increasing OSA knowledge increases confidence levels. Although many dental hygienists acknowledge the importance of OSA, there is limited knowledge and confidence in the management of patients with OSA. Continuing education on this topic may help to improve knowledge, importance, and confidence levels of practicing hygienists. Further research is needed to be able to generalize this information to all dental hygienists.