

## Original Research

# Perspectives of diabetes educators and dental hygienists regarding strategies to improve oral health for people with diabetes

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### Abstract

**Aims:** This study aims to explore the opinions of dental hygienists and diabetes educators on improving oral health for people with diabetes. **Methods:** Registered dental hygienists (RDHs) and certified diabetes educators (CDEs) who provided written responses to the same open-ended question from two state-wide mailing surveys (one for RDHs and the other for CDEs) “what more can you tell us to help improve oral health for people with diabetes?” were included in this study. The surveys were sent to all RDHs (n=2237) and CDEs (n=250) in the state of South Carolina, United States. **Results:** Of the 1125 valid returned questionnaires from both surveys, 474 provided written responses to this question. Qualitative analysis revealed three main themes from participants’ written responses which were: Education (3 subthemes: resources for patients, educate the public, and professional practice resources), interprofessional collaborative care (3 subthemes: role of medical and dental professionals in oral health promotion for people with diabetes, and role of dental and diabetes professional organizations, and companies in the oral health-care industry), and dental insurance. **Conclusions:** The three themes that emerged are interrelated indicating that strategies to improve oral health for people with diabetes are multi-faceted.

**Keywords:** oral health, health educators, diabetes mellitus, health promotion

### Background

Increasing scientific evidence has emerged to support the bi-directional relationship between diabetes and periodontitis [1]. Studies have shown diabetes is associated with

an increased risk for developing periodontitis and its progression, and periodontitis makes diabetes harder to control [2]. Therefore, people with diabetes are at greater risk for poor oral health compared to individuals without diabetes. Two recent systematic reviews found adults with diabetes have inadequate knowledge



and limited awareness of the increased risk for developing oral health complications associated with diabetes, poor understanding of the need to maintain good oral hygiene, and are less likely to have regular dental check-ups [3, 4]. In addition, people with diabetes often are not informed about the relationship between diabetic control and oral or periodontal diseases [5, 6], nor do they receive dental referrals from their primary or diabetes care providers [3, 4]. It is therefore essential to educate people with diabetes about their increased risk of oral health problems, the importance of practicing proper preventive oral care, and the need for regular dental check-ups.

Given the link between periodontal disease and diabetes, it requires care and patient education from both dental and medical care providers to achieve the goal of improved oral health in people with diabetes [1, 4, 7]. However, previous studies revealed that lack of time and limited knowledge (insufficient information) on oral care and diabetes among the providers are the two major barriers related to patient education [6, 8–11]. Additional barriers related to oral health education for patients with diabetes are insufficient dental insurance coverage and care access [12–15].

In conjunction with the barriers revealed in the literature on oral health education for patients with diabetes, it is important to seek opinions from diabetes educators and dental hygienists as to how to tackle this issue. However, little is known about the opinions of diabetes educators and dental hygienists in the United States (US) on improving oral health for people with diabetes. Hence, this study aimed to explore their opinions regarding this issue.

## Methods

### Study population and methodology

This qualitative study involved a cross-sectional survey design. Registered dental hygienists (RDHs) and certified diabetes educators (CDEs) who provided written responses to the same last open-ended question of two

state-wide mailing surveys (one for RDHs and the other for CDEs) “what more can you tell us to help improve oral health for people with diabetes?” were included in this study. The surveys were sent to all licensed RDHs and CDEs in the state of South Carolina, US. The objective of these two paper surveys was to investigate practices of RDHs and CDEs regarding their diabetes-related oral health preventive education. Address labels of the dental hygienists (n=2237) and diabetes educators (n=250) licensed to practice in South Carolina were purchased from the SC Board of Dentistry and the National Certification Board for Diabetes Educators, respectively. A detailed description of the procedure for disseminating the two surveys has been reported elsewhere [6, 8]. The study was approved by the Institutional Review Board of the Medical University of South Carolina.

### Content analysis

Participants’ written responses to the last open-ended question of the two surveys were analyzed using content analysis to identify categories suggested by RDHs and CDEs regarding improvement of oral health for people with diabetes [16]. After all the responses were entered into a Word document, the content analysis was completed as follows. To gain an overall impression of the written responses and to formulate tentative ideas, the three authors [HKY, HLS, and MMD] independently read all written responses several times. Initial codes that described the meaning of different text segments of the written response were manually assigned through open coding [17]. Through an ongoing process of comparing text segments across all written responses, the authors added codes as new topics emerged, and modified existing codes. As the analysis progressed, the authors grouped codes by their content similarity to create categories (axial coding), and then organized them into themes and subthemes [17].

The three authors independently analyzed all participants’ written responses to suggest categories for discussion. To enhance the credibility of the analysis, all three authors

reviewed each other’s data categorization and compared findings. They then met several times to check the plausibility of the data categorization and to discuss the meaning of the categories and themes. When there were disagreements, the authors reviewed participants’ original written responses, then discussed and resolved disagreements. To enhance the trustworthiness of interpretation of the written responses, an independent arbiter (LKV) with experience in qualitative research, but not involved in the initial survey studies, served as an external auditor to evaluate data categorization and interpretation.

## Results

The response rate for the RDH survey was 49.2%, whereas, the CDE was 64.1%. Of the 995 valid returned questionnaires from the RDH survey, 399 provided written responses to the last question, and of the 130 valid returned questionnaires from the CDE survey, 75 provided written responses to the last question. No participants’ background information or practice characteristics, except years of practice experience, were significantly associated with the provision of written responses at the 0.05 level (see Tables 1 and 2). Length of written responses ranged from phrases with 2–3 words (e.g. “increase

awareness,” and “motivate the patient”) to 3–4 sentences, with an average of 25 words per participant.

In addition to suggestions provided by participants, mainly dental hygienists, on various oral homecare preventive measures and specific periodontal treatments, three main themes emerged from participants’ written responses. The three themes related to improving oral health for people with diabetes were: education, interprofessional collaborative care, and dental insurance.

### Theme: Education

To assist people with diabetes and to acquire adequate knowledge to achieve better oral health and diabetes control, participants described several topics. These were the need to have appropriate and sufficient instructional resources for patients, to educate the public, and to have professional practice resources.

### Subtheme 1: Resources for patients

Participants of both professional groups sought consumer materials to educate patients about the importance of oral health and diabetes, what good oral health means, and techniques or

Table 1: Background information and practice characteristics of the dental hygienist participants (n = 995).

Characteristics	Mean ± SD (Range) or n (%)	
	Participants answered the last question (n = 399)	Participants did not answer the last question (n = 596)
Numbers of patients with diabetes treated a week	5.1±4.1	5.2±4.9
Duration of treatment session (minutes)	55.5±10.9	54.0±12.1
Practice experience (years) <sup>§</sup>	15.8±11.1	14.0±10.1
Worked in general dentistry setting	373 (92.3%)	529 (89.5%)
Worked at least 25 hours per week	291 (72.0%)	432 (73.1%)
Recommended recall interval of less than 6 months	280 (69.3%)	380 (64.5%)

Note. <sup>§</sup>No participants’ background information or practice characteristics, except years of practice experience, was significantly associated with provision of written responses at the 0.05 level. Frequencies do not sum to column totals due to missing data. Some percentages do not add up to 100 because of rounding.

Table 2: Background information and practice characteristics of the diabetes educator participants (n = 130).

Characteristics	Mean ± SD (Range) or n (%)	
	Participants answered the last question (n = 75)	Participants did not answer the last question (n=55)
<b>Work environment</b>		
Hospital	19 (25.3%)	18 (33.3%)
Community	17 (22.7%)	12 (22.2%)
Outpatient clinic	20 (26.7%)	11 (20.4%)
Private office	14 (18.7%)	10 (18.5%)
Other	5 (6.7%)	3 (5.6%)
Work at least 33 hours per week	44 (58.7%)	40 (74.1%)
<b>Hours/week with direct patient contact</b>		
8 or less	14 (18.9%)	5 (9.4%)
9–16	15 (20.3%)	6 (11.3%)
17–24	15 (20.3%)	12 (22.6%)
25–32	14 (18.9%)	18 (34.0%)
33 or more	16 (21.6%)	12 (22.6%)
<b>Primary education session format</b>		
One-on-one	24 (32.0%)	16 (29.6%)
Group	8 (10.7%)	5 (9.3%)
One-on-one and group	43 (57.3%)	33 (61.1%)
Practicing experience (years) <sup>§</sup>	11.4±7.7	8.9±6.0
Number of patients receiving services in a typical week	17.2±11.5	20.7±14.5
Diabetes education session duration (minutes)	95.0±66.9	95.2±58.2

Note. <sup>§</sup>No participants' background information or practice characteristics, except years of practice experience, was significantly associated with provision of written responses at the 0.05 level. Frequencies do not sum to column totals due to missing data. Some percentages do not add up to 100 because of rounding.

tips on improving oral healthcare for people with diabetes. They looked for short and direct education materials written in an easily read style for different diabetic patient groups, including those with low literacy and limited English proficiency. Culturally appropriate education materials (web-pages or brochures with web-links to videos) in different languages on oral health (periodontal disease) and diabetes, proper oral care for different groups of people with diabetes including children and parents, older adults, pregnant women, and persons who wear dentures or have no teeth were also recommended.

Participants acknowledged that information sent home with patients for review is essential to reinforce instructions provided in the dental office or diabetes self-management class. Patients may not receive this essential information during regular dental check-ups or diabetes self-management classes due to a lack of adequate time to spend on education or because they are overwhelmed with information that cannot be remembered and comprehended all at once. As one RDH participant stated, "If my office had brochures I could send home with diabetic patients that would explain condition, importance

of visits, and the importance of proper homecare, I believe it would reinforce what is said during appointment.”

For low-income patients or those without dental care insurance, participants suggested that it is important to provide resources to access dental care which may include a list of free local dental clinics for the uninsured, and local dental offices that accept Medicaid or a sliding scale fee. In addition, as suggested by an RDH participant “... more state funded dental clinics need to be available to provide better dental access.”

### Subtheme 2: Educate the public

To help promote oral health among people with diabetes, participants emphasized that efforts should not be confined to the dental offices and diabetes self-management classes. The public does not recognize the relationship between oral health and diabetes, therefore, educating and increasing public awareness of this issue is important. To increase public awareness, participants suggested various avenues including billboards, infomercials, articles in the news, magazines, and the internet. As one RDH participant indicated there is a need for “more public education so maybe we can gain these people as [dental] patients and further educate them.

### Subtheme 3: Professional practice resources

Both professional participant groups admitted that they needed to acquire more knowledge of the link between diabetes and oral health, and the impact of oral complications on diabetes self-management so that they can better educate their patients. As one CDE participant wrote “Educate me so I can educate my patients.” This can be accomplished through continuing professional education and in-service training on these topics. In addition, they all suggested the importance of having professional practice resources such as instructional materials and tools for use during oral health education and guides to ensure all essential areas on oral health and diabetes education are covered. For

CDEs, models of (diseased) teeth and gums, videos and flipcharts, and an oral health module in the diabetes education curriculum were proposed. For RDHs, a checklist of areas that they should cover with each patient with diabetes such as asking how often they check their blood glucose level and their HbA<sub>1c</sub> level at home, and brief healthy lifestyle education information related to measures for oral disease prevention were suggested.

### Theme: Interprofessional collaborative care

Participants all discussed the importance of interprofessional collaboration between medical and dental care providers in educating people with diabetes on oral health in relation to general body health, providing care to improve oral health, and reminding and following up on patients with diabetes for regular dental check-ups. Interprofessional collaboration also involved diabetes educators inviting a dentist or a dental hygienist in the local area to assist with the oral health module in the diabetes self-management education programming. Participants argued that health care professionals who provide care to people with diabetes, their professional associations, drug and insurance companies, and companies in the oral healthcare industry have the responsibility to educate the public about the importance of oral health for people with diabetes.

### Subtheme 1: Role of medical professionals in oral health promotion for people with diabetes

Participants, especially dental hygienists, stated that it would be helpful to dental professionals if more physicians who diagnose patients with diabetes would heighten awareness and inform their patients of the link between oral disease and diabetes, oral manifestations and complications associated with diabetes, and the importance of oral health for optimal glycemic control. As well, these same participants suggested that physicians should

encourage these patients to go for regular dental check-ups, and refer them for a periodontal evaluation. The importance of the role played by medical professionals was illustrated in the following quotes:

*If their physician who diagnoses the diabetes tells them the importance of oral care, they are more likely to seek it [dental care].*

*Having patient education about oral health at the medical doctors' office would help reinforce our efforts at the dental office.*

### **Subtheme 2: Role of dental professionals in oral health promotion for people with diabetes**

Participants suggested that the role of dental hygienists may include asking each patient about their blood sugar level, signs and symptoms of early oral manifestations of diabetes, and recommending a follow-up exam with their physician for proper diagnosis and treatment. Additional suggestions included patient education about the potential oral complications of diabetes, the impact of oral disease on diabetes self-management, and the promotion of proper oral care behavior. As one RDH participant stated when “significant changes are observed in the oral health of patients with diabetes, they should be referred to their physician for blood sugar testing.”

### **Subtheme 3: Role of dental and diabetes professional organizations, and companies in the oral health-care industry**

Participants suggested that the American Dental Association and American Diabetes Association should work together on major campaigns and advertisements to educate the public about the relationships between oral disease and glycemic control, and how diabetes could worsen oral health conditions. In addition, they should develop pamphlets, webpages, and audio-visual aids of culturally appropriate education materials for diabetic patients with different backgrounds (including different languages such as Spanish) so that all medical and dental care providers can provide the same high-quality

educational materials to their patients. Drug companies could help sponsor some conferences or continuing education sessions on oral health and diabetes for (oral) health professionals who work with patients with diabetes. In addition, a CDE participant suggested that the American Dental Association or American Dental Hygienist Association should “work with the American Diabetes Association to lobby to get oral health included as a mandatory module in chronic complications.”

### **Theme: Dental insurance**

The issue of access to dental care is not just confined to patients without dental insurance and those adults with Medicaid. Patients with private dental insurance are often limited by their insurance company to no more than twice a year prophylactic oral care without out-of-pocket spending. Participants suggested having such insurance policies changed would be of great benefit to patients with diabetes. As one RDH participant stated “Find a way with insurance companies to allow 3 months recall for patients with lots of calculus and bleeding. Patient cannot or will not pay out of pocket to do this regardless of how important or some simply cannot afford to [pay for it].” In addition, time spent educating patients in the dental office is not reimbursable. An RDH participant suggested “It would be nice for insurance companies to pay for patient education. A well-educated patient saves them more money in the long run.”

### **Discussion**

The findings were that both professions need more resources, would value an increase in interprofessional collaboration and suggested changes to dental insurance policies. The three emerging themes are interrelated, indicating that strategies to improve oral health for people with diabetes are multi-faceted. Strategies involve not just traditional didactic teaching of patients with diabetes, but a combination of RDHs and CDEs educating themselves, interprofessional collaboration, as well as support from the dental and

diabetes professional organizations, companies in the oral healthcare industry and dental care insurance companies for public education on oral health and diabetes.

The three main themes that emerged from the written responses of the participants have been briefly discussed in the literature on the practice of both dental hygienists and diabetes educators regarding oral healthcare and management for people with diabetes [6, 8, 9, 11, 18, 19]. Even though “lack of time” in providing oral health education does not emerge as a theme, this issue is tied to the bigger issue that time spent educating patients in the dental office is not reimbursable. If insurance companies allow for reimbursement of oral health education, lack of time would not be an issue. This study also illustrates an important strength of the qualitative analysis is that it captures outcomes that are not anticipated by quantitative measures (i.e. survey questionnaires) conducted in previous studies. In addition, our subthemes of resources for patients and professional practice resources, and the theme of interprofessional collaborative care mirrored results in other studies. Specifically the two subthemes (resources and a team care approach) under “Suggested Model of Care” were reported in a qualitative study conducted in Australia to explore the perceptions and practices of diabetes educators in providing oral healthcare to people with diabetes [18].

Even though there is a strong need to implement the guidelines established by the European Federation of Periodontology (EFP) and the International Diabetes Federation (IDF) concerning mutual care of diabetic patients by medical and dental healthcare professionals [20], there is little empirical evidence from both professionals to indicate this has been done. Findings from this study provide one piece of empirical evidence to support the need for mutual care of patients with diabetes to achieve the goal of improved oral health. To enhance the knowledge levels of both dental and medical care providers in the link between oral health and diabetes, interprofessional education and collaboration have been advocated repeatedly in the literature [11, 19, 21, 22], and such advocacy was also revealed in this study. For interprofessional

collaboration, dental hygienists can detect unrecognized potential dysglycemia and refer patients for medical check-ups [1], whereas diabetes educators can screen for oral problems, and refer patients for dental check-ups [20].

In the last few years, there has been some progress in the suggested strategies that participants made in assisting people with diabetes to improve their oral health. More information (e.g. pamphlets/brochures) has been made available on oral health and diabetes from a variety of sources such as health professional associations and the industry sector in oral healthcare. They all have generic oral health information, including brochures for people with diabetes in English or Spanish, which can be downloaded from their websites. In terms of audio-visual materials, there are short YouTube videos produced by companies in the oral healthcare industry, dental insurance agencies, and state dental associations. Lack of awareness and limited time at work may be factors that prevent (dental) healthcare providers’ efforts to search, obtain, and compile the information.

Primary care providers (e.g. physicians) and diabetes educators should encourage patients with diabetes to receive regular dental check-ups after explaining the link between periodontal disease and diabetes, and oral manifestations and complications associated with diabetes [23]. It was suggested by the participants in this study that this should be done by the physician when the patient is first diagnosed with diabetes, which is congruent with findings from a qualitative study on preferences of patients with diabetes to receive oral health information and education [24]. One study showed when physicians recommended their patients with diabetes have teeth and gums checked by a dentist twice a year, it is associated with more regular preventive dental care visits [25].

Education materials about oral health should be available to the patients at the physician’s office and in diabetes self-management classes. For patients who cannot afford dental care and without dental insurance, physicians’ offices and diabetes self-management education programs should provide a list of free local dental clinics or dentists who accept Medicaid

or a sliding scale fee. However, one of the barriers related to this task is that it requires a designated staff in the physician's office to compile and update the list of such clinics.

Since oral health is not part of the diabetes education module, diabetes educators sometimes may not think about or be aware of the importance of including oral healthcare information in the curriculum. Incorporating oral health in the core diabetes self-management curriculum will help remind diabetes educators to include this information when educating patients. Furthermore, an oral health module should be listed as a component of the diabetes education curriculum in the prevention of chronic complications in the National Standards for Diabetes Self-Management Education.

Professional collaborative care for patients with diabetes in oral health has been initiated for a while [1, 12]. However, until electronic medical and dental patient records are integrated and shared by the physicians and dentists within the same healthcare system, progress on patients' diabetes status to the dentists and oral health to the physicians will have to rely on the patients' self-report to their respective providers. In addition, unless the medical and dental care providers are in the same healthcare system, referrals of patients with diabetes from medical care providers for dental care will be challenging.

Companies in the oral healthcare industry have partnered with the American Diabetes Association to educate people with diabetes, the general public, and healthcare professionals about the important role that oral care plays in the management of diabetes and overall healthy living. For example, Colgate Total® has become a National Strategic Partner of the American Diabetes Association to support the development of the Association's new oral care activities [20].

None of the written responses in this study mentioned cross-education where diabetes educators or physicians would perform a mouth cavity examination as part of the physical to assess oral problems. Such healthcare delivery models were well received based on surveying knowledge, attitudes, and practices of medical professionals toward oral health [12, 26]. However, the ultimate goal for diabetes educators or

physicians in oral health promotion for this population is to get these people to early oral check-ups and care. Since regular dental check-ups are not just for people with diabetes, educating these patients about the importance of proper oral hygiene practices and the need to have regular dental check-ups would be a higher priority than conducting risk assessment through mouth cavity examination by diabetes educators or physicians. For dental professionals to expand their role beyond monitoring patients' blood sugar levels, diabetic educational or counseling activities would require them to receive appropriate training; and these activities may not be within the scope of their practice. Furthermore, achieving a high level of cross-education would require the creation of a standardized patient assessment tool and proper training, which would be limited by the medico-legal concerns related to each professional's scope of practice, time constraints and reimbursement.

### Limitations and recommendations

Even though the sample size ( $n=474$ ) of this qualitative study is considered to be large, the findings of this study were based on the analysis of the written response provided by the RDH and CDE participants practicing in one state (South Carolina) to one open-ended question. There was no opportunity for the researcher to probe the participants to elaborate their responses. In order to verify the findings (i.e. achieve transferability), it is recommended replication of this study should include individual in-depth and focus group interviews.

### Clinical relevance

**Scientific rationale for study:** Previous studies revealed major barriers related to oral health education for patients with diabetes include lack of time and limited knowledge (insufficient information) on oral care and diabetes among dental and medical providers [6, 8–11], and insufficient dental insurance coverage and care access [12–15]. Given these barriers, little is

known about the opinions of diabetes educators and dental hygienists on improving oral health for people with diabetes.

**Principal findings:** To assist people with diabetes acquire adequate knowledge to achieve better oral health and diabetes control, both dental hygienists (RDHs) and certified diabetes educators (CDEs) suggested the need to have appropriate and sufficient instructional resources for patients, to educate the public, and to have professional practice resources. Participants also emphasized the importance of inter-professional collaboration between medical and dental care providers in educating people with diabetes on oral health. Finally, they suggested having insurance policies changed to reduce the financial burden of patients with diabetes.

**Practice implications:** Findings provided important strategic planning across patient, general public, and care provider levels, involving interprofessional collaborative care, dental and diabetes professional organizations, and companies in the oral healthcare industry, to achieve the goal of improving oral health for people with diabetes.

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## Authors' Contributions

The first author designed the survey questionnaire. All list authors have made substantial contribution to data analysis, data interpretation and all revised the manuscript and approved the final manuscript.

## Conflict of Interest Statement

The authors declare that they have no conflict of interests.

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