



## What Dental Professionals Would Like Team Members to Know About Oral Health and Diabetes

In this section, you will find an overview of key medical issues related to oral health and diabetes. The information presented in this section validates key Healthy People 2020 objectives for diabetes and reinforces your value as pharmacy, podiatry, optometry, and dentistry (PPOD) professionals in the team care approach to comprehensive diabetes care.

**Healthy People 2020 Objective** (Released by the U.S. Department of Health and Human Services each decade, [Healthy People](#) is a set of goals and objectives with 10-year targets designed to guide national health promotion and disease prevention efforts to improve the health of all people in the United States.)

**Diabetes Objective #8 (D-8):** Increase the proportion of persons with diagnosed diabetes who have at least an annual dental examination.

**Target:** 61.2%.

**Baseline:** 55.6% of the population ages 2 years and older with diagnosed diabetes had been to the dentist in the past year, as reported in 2008 (age adjusted to the year 2000 standard population).

**Target Setting Method:** 10% improvement.

**Data Source:** [National Health Interview Survey](#), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics.



### Current Data and Trends<sup>1</sup>

Periodontal (gum) disease is more common in people with diabetes, so they need to be especially diligent about getting regular dental examinations. Other current data include:

- Among young adults, those with diabetes have about twice the risk of developing periodontitis as those without diabetes.
- Adults ages 45 or older with poorly controlled diabetes (A1C >9%) are 2.9 times more likely to have severe periodontitis than those without diabetes.
- People who smoke and have persistently elevated glucose levels have a 4.6 times greater risk for developing periodontitis.
- About one third of people with diabetes have severe periodontal disease consisting of loss of attachment (5 millimeters or more) of the gums to the teeth.

### Diabetes-related Oral Health Conditions

Periodontal disease is a very common complication of diabetes.<sup>2</sup> Other diabetes-related oral health conditions include:

- Xerostomia (dry mouth syndrome, which can be caused by impaired salivary gland function in people with diabetes possibly due to decreased blood flow to salivary glands and decreased local production of saliva, dehydration due to hyperglycemia, and side effects of drugs such as diuretics used for hypertension and other cardiovascular diseases).
- Tooth loss.
- Dental caries (cavities) and abscesses.
- Oral candidiasis (a fungal infection in the mouth, also known as thrush, that may appear as white patches or plaques on the tongue and other oral mucous membranes).
- Oral lichen planus (an ongoing inflammatory condition that affects mucous membranes inside the mouth and may appear as white, lacy patches; red, swollen tissues; or open sores. These lesions may cause burning, pain, or other discomfort.).
- Burning mouth syndrome (chronic or recurrent burning in the mouth, which may affect the tongue, gums, lips, inside of the cheeks, roof of the mouth, or widespread areas of the whole mouth).

The relationship between periodontal disease and diabetes has been broadly studied, while the relationship between other oral diseases and diabetes requires further research.<sup>3</sup> The evidence supporting the linkage between periodontal disease and diabetes is based upon the pathophysiologic principle, in which the harm of an infective and inflammatory disease such as periodontitis can have pronounced adverse effects for individuals with diabetes due to their altered immune system and reparative processes.<sup>4</sup>

In periodontal disease, biofilms containing gram-negative anaerobes initiate an immune response that results in the local and systemic release of a cascade of mediators and factors. This response affects insulin sensitivity and places those with diabetes at greater risk for diabetes complications—namely cardiovascular disease and kidney disease.

Therefore, eliminating risk factors that initiate the immune response and the release of harmful mediators such as C-reactive protein, interleukins, and tumor necrosis factor bears importance for the prevention and treatment of periodontal disease.

Other possible mechanisms of the diabetes/periodontitis relationship include:

- Altered host response
- Alterations in connective tissue
- Microangiopathy
- Changes in the gingival crevicular fluid
- Subgingival microflora and hereditary predisposition

### Patient Case Example

Noting that her patient with diabetes smokes, a dental hygienist informs him of the links between tobacco use and oral cancer. She also explains that tobacco use can increase diabetes complications, including periodontal disease.

She lets him know about programs that can help support him in quitting, such as 1-800-QUIT-NOW (1-800-784-8669) and [Diabetes HealthSense resources](#).

The dental hygienist notes in the chart that the dental team should follow up with the patient on this advice the next time he is seen.



## Comprehensive Oral Health Examination

The oral health and diabetes relationship has primarily focused upon the reciprocal connection between periodontal disease and diabetes. However, this linkage is just one reason why oral health is an important part of diabetes management. Oral health providers should review the following factors with patients who have diabetes during a comprehensive oral health examination.

### The Functional Dentition and Nutrition

Functional dentition is an important part of proper nutrition because the act of chewing is compromised if fewer than 20 teeth are present. Oral dysfunction leads to an increased risk of alimentary problems, orofacial pain, and the loss of physical and emotional well-being.

Evidence suggests that there is a relationship between a patient's healthy body mass index and the ease with which he or she can chew, called masticatory efficiency. Poor dentition also affects the absorption of nutrients if food is not adequately masticated. The patient's masticatory efficiency may affect his or her dietary choices. However, additional research is needed to establish the relationship among masticatory efficiency, general health, and quality of life.<sup>5</sup>

### The Oral and Systemic Health Connection

#### Significance of Treating Periodontal Disease to Improve Glycemic Control

The Diabetes Control and Complications Trial (DCCT) and UK Prospective Diabetes Study (UKPDS) demonstrated the importance of improving glycemic control. Intensive blood glucose management in type 1 diabetes (DCCT) and type 2 diabetes (UKPDS) resulted in reduced diabetes complications (retinopathy, nephropathy, and neuropathy). Reducing A1C by 1% lowers microvascular complications by 35%, while a 0.2% reduction lowers mortality by 10%.<sup>6,7</sup> Several meta-analyses have shown that treating periodontal disease can reduce A1C by at least 0.4%.<sup>8,9,10,11</sup>

Studies of the Pima Indians and Gila River Indians found that periodontal disease is related to 3.2 times greater risk of cardio-renal mortality<sup>12</sup>, and moderate to severe periodontal disease or edentulism is associated with a 2.0 to 2.6 times greater risk for microalbuminuria and a 2 to 5 times greater risk for end-stage retinal disease.<sup>13</sup>

Therefore, preventing and treating periodontal disease is important because periodontal disease negatively affects glycemic control and increases the risk of diabetes complications. Research suggests that periodontal disease may be a risk factor for the development of type 2 diabetes, but this evidence is mixed<sup>14,15</sup>, necessitating further epidemiologic study.



## Common Modifiable Risk Factors

Oral health and diabetes management have many notable similarities. The World Health Organization notes that noncommunicable diseases (NCDs) such as diabetes and oral disease share preventable risk factors related to lifestyle, including diet and tobacco use.<sup>16</sup>

Improving health outcomes by modifying these common behavior-related risk factors would assist in the prevention, primary care, and ongoing management of NCDs.

## Tobacco Use

Diabetes and tobacco use are common risk factors for the development of cardiovascular disease, the complication that accounts for the highest morbidity, mortality, and health care costs in diabetes.<sup>17</sup>

In addition, tobacco use promotes periodontal degeneration, suppresses the immune system, and delays healing.<sup>18</sup> Therefore, tobacco use must be mitigated through prevention and cessation programs.

## Nutrition

Poor nutrition is a risk factor that drives the NCD epidemic. Diets rich in carbohydrates and with a high sugar content compromise oral health and are leading contributors to the rise of type 2 diabetes.<sup>19</sup>

Globalization of this western dietary trend is a component of the growing incidence of dental caries<sup>20</sup> and type 2 diabetes in the developing world.<sup>21</sup> To battle oral disease and diabetes, PPOD providers need to promote their patients' health and encourage public education



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focusing on the importance of making dietary choices that support a healthy lifestyle. The Academy of Nutrition and Dietetics supports the collaboration between dietetics and dentistry in research, curriculum, and practice roles.<sup>22</sup>

### GDM, Periodontal Disease, and Pregnancy Outcomes

Substantial evidence shows that patients with type 2 diabetes face increased severity of periodontal disease.<sup>23,24</sup> Data also show that the presence of periodontal disease is higher in women with gestational diabetes mellitus (GDM) than in pregnant women without GDM.<sup>25,26</sup>



Recently, data on the relationship among diabetes, periodontal disease, and pregnancy outcomes (combined effect) revealed that women with the combination of GDM plus periodontal disease had a 2.3-fold greater risk for developing adverse maternal outcomes than women with either GDM or periodontal disease alone. In addition, probing pocket depth, independent of GDM status, was a significant predictor of adverse pregnancy outcomes. However, women with the combination of GDM plus periodontal disease had no greater risk for adverse fetal outcomes than women with either GDM or periodontal disease alone.<sup>25</sup>

Currently, studies are under way to determine the effect of periodontal therapy on adverse maternal outcomes in women with GDM and periodontal disease. Women with GDM should be referred to their dentist to evaluate their oral health status and maintain their periodontal health during pregnancy. Women with GDM should be encouraged to have their blood glucose levels evaluated soon after delivery and on a regular basis thereafter to determine their status relative to type 2 diabetes mellitus, since women who have had GDM have a 35% to 60% chance of developing diabetes in the next 10–20 years.<sup>1</sup>

### Oral Health Care Professionals: Part of the Health Care Team

There is a real opportunity for oral health professionals to educate other members of the health care team about the oral/systemic health connection in diabetes. Unfortunately, many health care providers have had little, if any, training about the oral/systemic health link.<sup>27</sup> PPOD providers can help change this as they collaborate with other members of the health care team and educate others about what they do.

More than 80% of recent internal medicine trainees never ask patients if they have been diagnosed with periodontitis, 90% did not receive any training about the periodontal/systemic link in medical school, and more than 40% believe that discussing periodontal disease is not related to their roles as physicians. Twenty-two percent state that they never refer patients to dentists.<sup>28</sup>

Diabetes educators also report a lack of knowledge about the oral health/systemic link. A survey of Certified Diabetes Educators (CDEs) found that most do not routinely provide oral health education to people with diabetes primarily due to lack of time and knowledge related to oral health. Of 130 respondents, 94% felt that oral health should be part of the curriculum, yet only 23% reported that the curricula used for their patients included an oral health module.<sup>29</sup>

Another study showed that only 51% of CDEs discussed oral health with their patients. Most, however, agreed with the need to collaborate with dental professionals in the total diabetes care management of their patients and agreed that adding an oral health component to their own continuing education would be useful.<sup>30</sup> The bottom line is that increased training for both dental and medical providers about the oral health/systemic connection is important and may help to improve clinical outcomes in people with diabetes.

## **Screening for Undiagnosed Diabetes**

The dental office may also be a useful setting in which to identify individuals with undiagnosed diabetes.<sup>31,32</sup> As the incidence of diabetes continues to rise, with a concomitant number of undiagnosed patients, the dental team may be able to screen people using a questionnaire for risk assessment based on the National Health and Nutritional Examination Survey (NHANES) III.

CDC performed this survey to collect information about the health and diet of Americans. The self-reported information provided by the patients' completion of the questionnaire, along with an intraoral periodontal exam, could identify those at risk so that they can be referred to their primary health care provider for further assessment.

## **Guidelines for Oral Disease**

Several professional organizations have developed guidelines and tools to help providers prevent and manage periodontal disease and other oral health conditions in patients with diabetes.



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The National Institute for Clinical Excellence developed a [checklist](#) of modifying factors to determine the recommended interval between dental recalls.<sup>33</sup>

- The recall interval is determined specifically for each patient and is based on his or her needs, according to a risk assessment for oral disease.
- The recall interval ranges from a minimum of 3 months to a maximum of 12 months (ages 18 years or younger) to 24 months (more than 18 years of age).

The [American Academy of Periodontology](#) has developed guidelines and resources for the management of patients with periodontal diseases.<sup>34</sup>

- Risk assessment was the basis for criteria to assist the dental team in identifying and referring patients for specialty care.

The [International Diabetes Federation](#) guidelines on oral health for people with diabetes provide recommendations on clinical care for people with diabetes.<sup>3</sup>

- The recommendations stress that diabetes care providers should ask their patients annually if they receive professional oral health care and explain to them that oral health home care is an important component of their diabetes self-management.
- Diabetes care providers should also ask patients if they are experiencing symptoms of periodontal disease and educate them on the implications of periodontal disease in diabetes management.

### Patient Case Example

A dentist sees a 55-year-old man for a new patient exam. The man is experiencing limited mobility of his lower front teeth, halitosis, a dry mouth, and problems chewing.

The patient has not seen a doctor or dentist in several years, and he has a family history of diabetes. Oral examination reveals periodontal disease.

The dentist explains the connection between diabetes and oral health problems and suggests that the patient see his primary care provider as soon as possible to determine if he has diabetes. The dentist also refers the patient to a periodontist for assessment and care.

## Patient Education

### Diabetes Self-Management Education

Effective diabetes management and oral health are impossible to attain without self-management skills. With patient education and ongoing self-management support, patients can learn the importance of oral health and necessary skills. This education and support offers patients the necessary knowledge and self-efficacy to perform these skills and incorporate them into their oral health routine to achieve sustainable outcomes.

Yet, people with diabetes often are not aware of the significance of the relationship between poor oral health and diabetes. A study of oral self-care and self-perceived oral health in type 2 diabetes patients noted that 85% received no information about the relationship between oral health and diabetes, 83% were unaware of the link, and 48% thought that the dentist or dental hygienist was unaware that they had diabetes. They were also less likely to have visited a dentist in the past 12 months because of the lack of perceived need and cost.<sup>35</sup>

These results indicate that challenges exist in improving education programs in dental offices in order to raise awareness and understanding of the relationship between oral health and overall health.

Through analysis of the psychosocial characteristics of oral health habits and adherence among diabetes patients, researchers discovered a correlation between these behaviors.<sup>36</sup> Self-efficacy was found to be the best determinant in oral health and general health behavior and may be the best predictor of a health-promoting lifestyle.

Supporting self-efficacy in one aspect of health care may also translate into improved self-efficacy in other aspects of health care. Health care professionals may be able to improve patient self-efficacy by promoting a positive psychological state through support and positive feedback.<sup>37</sup>

Therefore, oral health care providers must:

- Recognize the importance of educating patients about the relationship between oral health and diabetes.
- Provide patients with the self-management skills to manage this relationship.
- Provide patients with support and feedback to promote self-efficacy for oral health and other healthy behaviors.
- Encourage patients to visit their dental provider at least once a year for a full mouth exam.



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- Teach patients the most effective way to brush their teeth and use dental floss.
- Teach patients about the early signs of tooth, mouth, and gum problems, and about the link between diabetes and gum disease.

Please visit the [Resource Center](#) section of the PPOD Guide and Toolkit for resources on oral health.

### **Key Questions That All Members of the Health Care Team Should Ask About Oral Health**

*Patients should be referred to an oral health professional if the answers to these questions are “no” or “unsure”:*

- Do you visit your dental provider at least once a year for a full-mouth exam?
- Do you know how diabetes can affect your teeth and gums?
- Do you know the best way to brush your teeth and use dental floss?
- Do you know the early signs of tooth, mouth, and gum problems?
- Do you have any problems in your mouth, such as loose teeth, red or swollen gums, burning, difficulty chewing, or poorly fitting dentures?

### **Key Points**

- Dental professionals are important participants in a collaborative team care approach for diabetes management.
- Oral health care providers play a key role in treating and controlling periodontal disease, maintaining oral function, developing self-efficacy via self-management behaviors that prevent and control oral disease, and addressing common modifiable risk factors.
- Oral health care providers also may be able to identify people with undiagnosed diabetes by screening those at risk and referring them to their primary health care provider for diagnosis.

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**Periodontal (gum) disease**



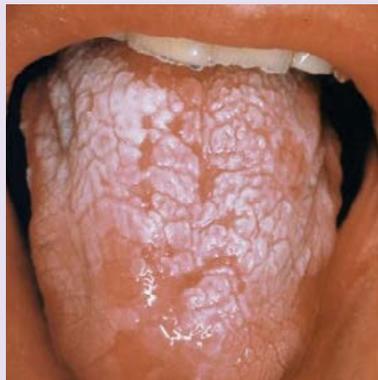
**Periodontal (gum) disease**



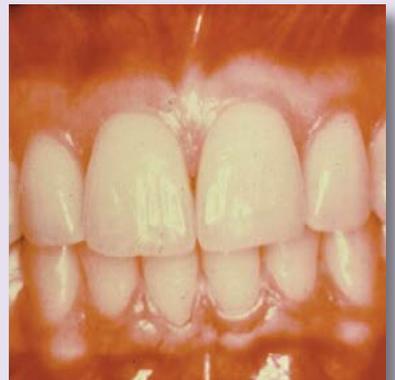
**Periodontal abscess**



**Periodontal abscess**



**Thrush (oral candidiasis)**



**Healthy gums and teeth**