Diabetes Mellitus and the Dental Healthcare Professional

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Learning Objectives

- Review the Pathophysiology of Diabetes.
- Discuss the Interrelationship Between Diabetes and Oral Health.
- Describe the Oral Complications Commonly Observed in Patients With DM
- Identify the Management Considerations For the Dental Patient with Diabetes.
- Explore Your Role As Part Of An Interdisciplinary Team In Caring For Patients With DM.
DISCLOSURE INFORMATION
for
Jerry A Brown DMD, CDE

• I have the following financial relationships to disclose:
  Speaker’s Network for: Colgate Oral Health
• I am making this presentation on behalf of Colgate.
• The information being presented today is consistent with FDA rules and guidelines.
“Diabetes is a group of diseases marked by high levels of blood glucose resulting from defects in insulin production, insulin action, or both.”

CDC Website (http://www.cdc.gov/diabetes/pubs/general11.htm)
$327 Billion in Medical Costs/ Year


$237 billion for direct medical costs.

$90 billion in reduced productivity.

32% of Medicare Dollars Go To Treat Diabetes.

For every 1,000 patients you see 350 of them are likely to be metabolically challenged!!!
Diabetes Mellitus

**Type 1 Diabetes**
- Autoimmunity
  - Risk Factors: Genetic, Environmental
  - Beta Cell Destruction
- No Insulin Production

**Type 2 Diabetes**
- Insulin Resistance
  - Risk Factors: Modifiable, Non-modifiable
  - Beta Cell Dysfunction, Beta Cell Destruction
- Reduced Insulin Production
  - Reduced Insulin Sensitivity

**Hyperglycemia**
Extracellular fluid (blood)

Muscle cell cytoplasm

Add Glucose
Types of Metabolic Challenges

• **Pre-diabetes**
  • A condition that occurs when a person’s blood glucose levels are higher than normal but not high enough for a diagnosis of type 2 diabetes
  • 84 million people in the U.S. have pre-diabetes (2015)
  • Almost always occurs before people develop type 2 diabetes
  • More likely to develop type 2 diabetes within 5 years
  • More likely to have a heart attack or stroke

Criteria For A Diagnosis of DM

A1C Greater than or equal to 6.5%
  OR
Fasting plasma glucose ≥ 126 mg/dL
  OR
2hr. plasma glucose ≥ 200 mg/dL during OGTT
  OR
Random plasma glucose ≥ 200 mg/dL in a patient with classic hyperglycemic symptoms
Risk Factors of Type 2 Diabetes

- Modifiable:
  - Overweight/Obesity
  - High blood glucose
  - Hypertension*
  - Abnormal Lipid Metabolism
  - Physical Inactivity
  - Smoking

https://www.cdc.gov/tobacco/data_statistics/sgr/50th-anniversary/pdfs/fs_smoking_diabetes_508.pdf
Risk Factors of Type 2 Diabetes

- Non-Modifiable-
  - Age
  - Race & Ethnicity
  - Genetics
Other Risk Factors For Type 2 Diabetes

“Even a few missing teeth may indicate an increased risk of CVD, diabetes, or all-cause mortality. When individual risk factors for chronic diseases are assessed, the number of missing teeth could be a useful additional indicator for general medical practitioners.”


“Compared with participants with healthy periodontal conditions, participants with intermediate levels of periodontal disease had a two-fold greater risk for incident diabetes...”

Signs and Symptoms of Uncontrolled Diabetes Mellitus

3Ps of the uncontrolled diabetic state

Polydipsia  Polyuria  Polyphagia
Signs and Symptoms of Uncontrolled Diabetes Mellitus

Always tired.

Sudden weight loss.

Wounds that won't heal.
Diabetes Management

• Type 2:
  Weight control with Healthy diet with Exercise regimen
If necessary:
  Oral medication(s) Insulin
Combination Therapy
Diabetes Management

- Type 1:
  Multiple Daily Injection of exogenous insulin(s)
  or
  Exogenous insulin through an insulin pump
  with
  Accurate carbohydrate counting
  with
  Daily monitoring of blood glucose
  with
  Prescribed exercise regimen

“Think like a pancreas!”
Blood Glucose Meters
Continuous Glucose Monitor (CGM)
Continuous Glucose Monitor
Insulin by Syringe or by Pen
Insulin Pen Injection
Insulin Pump
Systemic Complications of Diabetes

1. **Retinopathy**
   Visual impairment up to and including blindness from retinopathy, glaucoma, macula edema

2. **Nephropathy**
   Renal failure

3. **Neuropathy**
   Sensory loss and damage to limbs
   Gastroparesis, ED, Silent MI

4. **Macrovascular Disease**
   - Heart Disease and stroke
   - Leading cause of death

5. **Poor Wound Healing**
   Foot ulceration, gangrene and lower limb amputation

6. **Periodontal Disease (Loe 1993)**
   6th complication of diabetes

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Periodontal Disease And It’s Relationship To Diabetes

• The most well-researched systemic risk factor for periodontal disease is diabetes.

• A “bi-directional relationship” exists between these two inflammatory diseases.

• Evidence suggests that the presence of periodontitis can adversely affect metabolic (glycemic) control in patients with Diabetes Mellitus.

• Prevalence of both Diabetes Mellitus and Periodontal Disease increases with age.
Bacterial Invasion

Diabetes (Poorly-Controlled)

Systemic Immune Inflammatory Response

Exaggerated Cytokine Release

Periodontium

Fibroblast Replication

Osteoblast Replication

Osteoclast Replication

Fibroblast Suicide

Neutrophil Attack

Tissue Destruction

Collagen Repair

Alveolar Bone Repair

Alveolar Bone Loss

Attachment Loss

Bacterial Multiplication
Impact of Periodontal Disease On Diabetes

Inflammatory Response To Periodontal Pathogens

- Elevated levels pro-inflammatory cytokines in the gingival sulcus.
- Cytokines from the gingival sulcus released into systemic circulation.
- Cytokines stimulate release of CRP from liver.
- Cytokines/CRP involved with insulin resistance.

Hyperglycemia

Diabetes ←→ Periodontal Disease: A Bidirectional Relationship
Effect of Periodontal Therapy On Glycemic Control

“...non-surgical periodontal treatment results in a mean reduction in HbA1C of 0.36%.”


Non-surgical Perio Tx Group 6 months post-treatment:
• 0.51% Reduction in HbA1C
• FPG Reduced by almost 19mg/dL
• Statistically significant improvements in perio/gingival index

When we work together...

Treating Gum Disease Means Lower Annual Medical Costs

- Diabetes
  - $2,840 (40.2%)
  - $5,681 (40.9%)

- Stroke
  - $1,090 (10.7%)

- Heart Disease
  - $2,433 (73.7%)

- Pregnancy
  - 21.2%

Significant annual cost savings are possible when individuals with certain chronic diseases (diabetes, cerebral vascular disease, or coronary heart disease), or who were pregnant, received dental treatment for their gum disease, after accounting for the effect of diabetes.

Treating Gum Disease Reduces Hospital Admissions

- Diabetes
  - 39.4%

- Stroke
  - 28.6%

- Heart Disease
  - 21.2%

Significant decreases in annual hospitalizations are possible when individuals with certain chronic diseases received dental treatment for their gum disease, after accounting for the effect of diabetes.