

# INTEGRATION OF CARE BETWEEN MEDICAL AND ORAL HEALTH DISCIPLINES

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# Integrated Dental Medicine

- Is based in the fact that oral health is a vital aspect to overall systemic well being
- A partnership between all health care providers that identifies and creates a care structure with the areas of overlap that can improve the patient experience
- Sets goals to improve both oral and systemic outcomes
  - Systemic treatment with dental care

DentaQuest  
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## Levels of Integration

- Low (basic/simple)
- Moderate
- High
- Creative

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safety net  
SOLUTIONS



# Levels of Integration

- **Basic Level Integration:** A bi-directional cross-referral process supporting referrals from dental to medical and vice-versa; consistent appointment queries during patient encounters for appointment due dates; use of cross promotional propaganda; BMI, blood pressure, and heart rate measurements administered in the dental setting.
- **Moderate Level Integration:** All providers possess a basic understanding of complementary disease processes; appropriate application of medical and dental interventions; target population identification and understanding; achieving or nearing meaningful use; partnerships facilitating community outreach; topical fluoride application in the medical setting.
- **High Level Integration:** A high percentage of patients having seen both medical and dental providers on a regular basis; population health care coordination; implementation of a quality assurance plan; sharing of systemic disease benchmarks; high level medical and dental screenings.
- **Creative Level Integration:** A 'wide- open' level that should encourage innovation, allows creativity, and facilitates professional and patient development.

# Target Populations

- Based on Population Health
- Assess the most at risk populations with individual practices and start by focusing on those patients
- Reach a level of success with those individual populations and move onto the next

# Initial Primary Pediatric Care



# Pediatric Primary Care – Caries Disease

- CDC: One in five children have untreated decay
- Pew: 29 million children enrolled in Medicaid: only 12.9 million received dental care
- Cavities are the 4<sup>th</sup> most expensive disease in the U.S.
- Poor children had one half the number of dental visits compared with higher income children
  - Limited access to dental: higher encounter rates with medical
- “Despite acknowledgement of this problem by dental health providers little has changed to improve these statistics.”\*\*
- Pediatricians may be able to improve oral health outcomes.

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**\*\*Mattheus and Mattheus (2014); CDC (2010); Truman et al. (2002); USDHHS (2000); PEW (2011)**

# Fluoride application at Child Well Visits

- Children with 4 or more treatments had 15.5 dmfs (95%CI 10.8–20.4) versus children with no fluoride varnish treatments who had 23.6 dmfs (95%CI 19.5–25.8) for a **35% decrease in overall caries.**
- Fluoride varnish applied at well child care visits can reduce early childhood caries.

# Barriers to Universality

- Pediatricians will require adequate training in oral health in medical school, residency and CE courses.
- Pediatricians will require current information and guidelines on preventive dental care.
  - Lewis et al. reports that very little is available to guide pediatricians in oral health promotion that goes beyond cursory oral health advice that is limited to fluoride and dental referral
- Pediatricians must be ensured that all of their patients, Medicaid and uninsured included, can receive timely preventive and restorative dental care.
- Pediatricians will require sufficient resources to successfully assume greater involvement in oral health related activities. Time pressures and inadequate staffing as well as low reimbursement will make it difficult for pediatricians to devote attention to oral health.



# Poor Glycemic Control

- Expanding body of literature implicating severe periodontitis as a risk for poor glycemic control
- Periodontal treatment in individuals with diabetes can improve glycemic control
  - Leading to a reduction of the effects of diabetes

# Poor Glycemic Control

- Landmark Study – Pima Indian Tribe (Az)
  - Effective treatment of periodontal infection and reduction of periodontal inflammation is associated with a reduction in level of glycated hemoglobin.
  - In addition, at 3 months, significant reductions ( $P \leq 0.04$ ) in mean HbA<sub>1c</sub> reaching nearly 10% from the pretreatment value.
  - Control of periodontal infections should thus be an important part of the overall management of diabetes mellitus patients.

# Poor Glycemic Control

- Stewart et al. – statistical review of study suggests that periodontal therapy was associated with improved glycemic control in persons with type 2 DM.
  - During the nine-month observation period, there was a 6.7% improvement in glycemic control in the control group when compared to a 17.1% improvement in the treatment group, a statistically significant difference.

# Question of Linkage from Medicine

- Engebretson et al. (2013)
  - At 6 months, mean HbA<sub>1c</sub> levels in the periodontal therapy group increased 0.17% (SD, 1.0), compared with 0.11% (SD, 1.0) in the control group
  - Conclusion: Nonsurgical periodontal therapy did not improve glycemic control in patients with type 2 diabetes and moderate to advanced chronic periodontitis. These findings do not support the use of nonsurgical periodontal treatment in patients with diabetes for the purpose of lowering levels of HbA<sub>1c</sub>.

# Meta analysis

- Meta-analyses confirm that reductions in glycated hemoglobin (HbA1c) can follow effective periodontal therapy.
  - Janket et al.: The weighted average decrease in actual HbA1c level was 0.38% for all studies, 0.66% when restricted to type 2 diabetic patients, and 0.71% if antibiotics were given to them.
  - **Cochrane Collaboration** published a review of studies that investigated the relationship between periodontal disease and the glycemic control: They reported a reduction in HbA1c of 0.40% 3–4 months after conventional periodontal therapy

# Importance of Reductions

- Stratton et al. in 2000 reported that each 1% reduction in HbA1c is associated with 21% reduced risk of any endpoint related to diabetes, 21% for deaths related to diabetes, 14% for myocardial infarction and 37% for microvascular complications.

# Summary

- Different messages; communication to patients differs
  - Reduction in A1C does occur according to meta-analysis
  - Periodontal therapy alone will not significantly reduce glycemic levels in patient
  - Fight against edentulous outcomes (Symptomatic vs. Asymptomatic)
  - More than a year / three month intervals

# Periodontal disease as a predictor

- Conflicting data; HOWEVER,
- Studies have demonstrated that it is an early complication of diabetes
- Pre-existing periodontitis predicts poor cardiovascular and renal outcomes

# Dental-Medical Screening

- Analysis of the NHANES revealed that an algorithm using simple periodontal measures, available only in dental settings, and risk factors known by patients may offer an unrealized opportunity to identify undiagnosed individuals.
- Finding supported by two other retrospective studies.

1

- At least one of the following self-reported risk factors
  - Family history of diabetes
  - Hypertension
  - High cholesterol
  - Overweight/Obesity

2

- Continue to receive a periodontal examination
  - Simple algorithm composed of two dental parameters
    - Number of missing teeth
    - Percentage of deep periodontal pockets
  - *Optimal cut-offs of  $\geq 26\%$  deep pockets and  $\geq 4$  missing teeth*

3

- A point of care HbA1C test
  - Fasting – at second appointment
  - The addition of a fingerstick HbA1C with 2 dental parameters are of significant merit (73% to 92% increase in sensitivity)

# Cardiovascular Disease



# Lockhart et al.

American Heart Association, April 18, 2012.

- Available data indicate a general trend toward a periodontal treatment–induced suppression of systemic inflammation and improvement of noninvasive markers of ASVD and endothelial function.
- **HOWEVER**, The effects of PD therapy on specific inflammatory markers are not consistent across studies, and their sustainability over time has not been established convincingly.

## Lockhart et al. (AHA)

- **HOWEVER**, This review highlights significant gaps in our scientific understanding of the interaction of oral health and ASVD.
- **HOWEVER**, Identification of clinically relevant aspects of their association or therapeutic strategies that might improve the recognition or therapy of ASVD in patients with PD would require further study in well-designed controlled interventional studies.

# Cardiovascular Disease

- Where are we looking now?
  - Association between number of missing teeth and cardiovascular disease
- “The knowledge gaps included limited understanding of the relationship of the number of missing teeth and cardiovascular disease.”

# Association with cardiovascular disease and missing teeth

- Biological mechanisms proposed for an association of the number of missing teeth and cardiovascular disease include:
  - (1) Inflammation,
    - Chronic oral infection contributes to systemic inflammation and increases in the plasma concentration of acute-phase proteins, inflammatory cytokines and coagulation factors which increase the potential for cardiovascular disease (persists long after tooth extraction)
  - (2) Infection,
    - Bacterial end products enter the blood stream and result in transient bacteremias
  - (3) Diet and nutrition
    - Based on the dysfunctional masticatory system and on the ability to obtain proper nutrition from the diet

# Connection of CVD and Missing Teeth

- Limited large quantity studies, so
- New study: 275,424 subjects
- Older adults with 1 to 5 missing teeth and greater than 6 missing teeth, but not all teeth missing, were more likely to report presence of cardiovascular disease as compared with older adults who had no missing teeth.
- Observed that adults who visited the dentist were less likely to report cardiovascular disease compared to those who did not visit dentists in the past year.

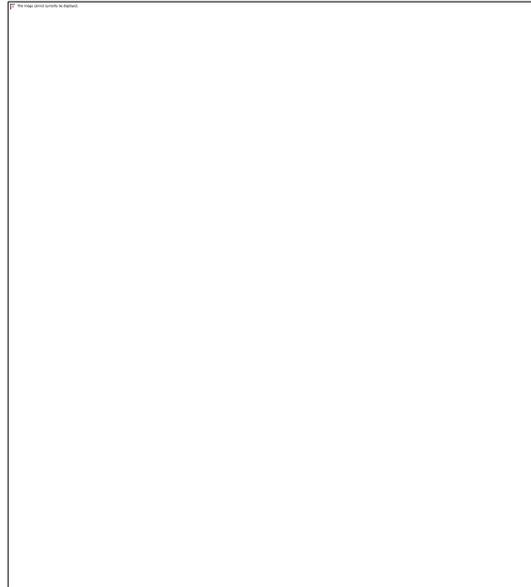
# Blood Pressure Evaluation (Detecting HTN)

- Dental care is usually the only public health profession/organization to which healthy people consistently come for regular check ups.
- Thus, the dental service might be one of the most suitable health care entities for systematic opportunistic screening of healthy subjects.
- Engstrom et al. found that dental based blood pressure screening was efficient, effective for detecting previously unknown hypertension, and that one out of every 18 subjects screened had confirmed hypertension.

# Referral Guidelines for Dentists

Diastolic Pressure	Systolic Pressure		
	100 -130	131 - 189	≥ 190
≤ 90	No Action	Advise Patient of Need for Correction (Refer for Primary Care evaluation)	Immediate Action
91 – 109	Advise Patient of Need for Correction (Refer for Primary Care evaluation)	Advise Patient of Need for Correction(Refer for Primary Care evaluation)	Immediate Action
≥110	Immediate Action	Immediate Action	Immediate Action

# Oral Health and Stroke



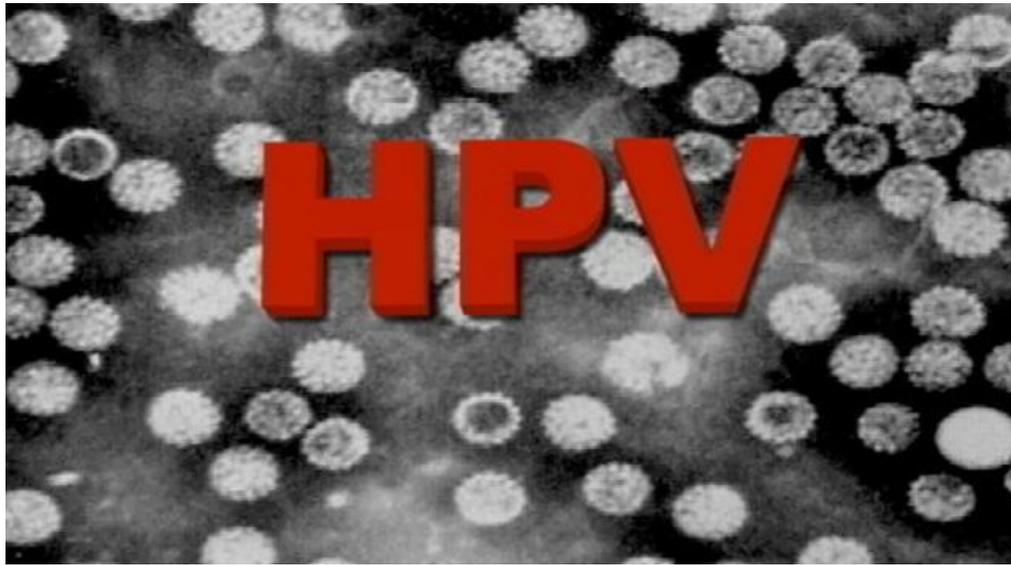
# Periodontal Disease and Stroke

- Post hoc analysis of prospective longitudinal studies and smaller case control studies have reported the association between periodontal disease and stroke
- Early studies demonstrated that periodontal disease appears to bear a stronger association with stroke than with coronary artery disease.

# Periodontal Disease and Stroke

- In a combined analysis of two prospective studies, periodontal disease was found to increase the risk of incident stroke nearly three fold.
- Proposed mechanisms include inflammation mediated pro-coagulant state, atherosclerosis mediated by direct microbial invasion of blood vessel wall, and interaction with recognized vascular risk factors.

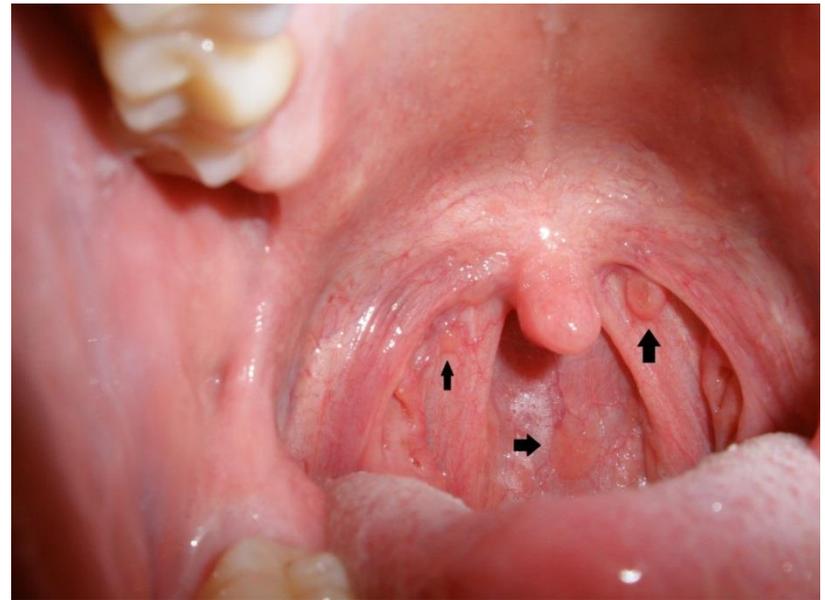
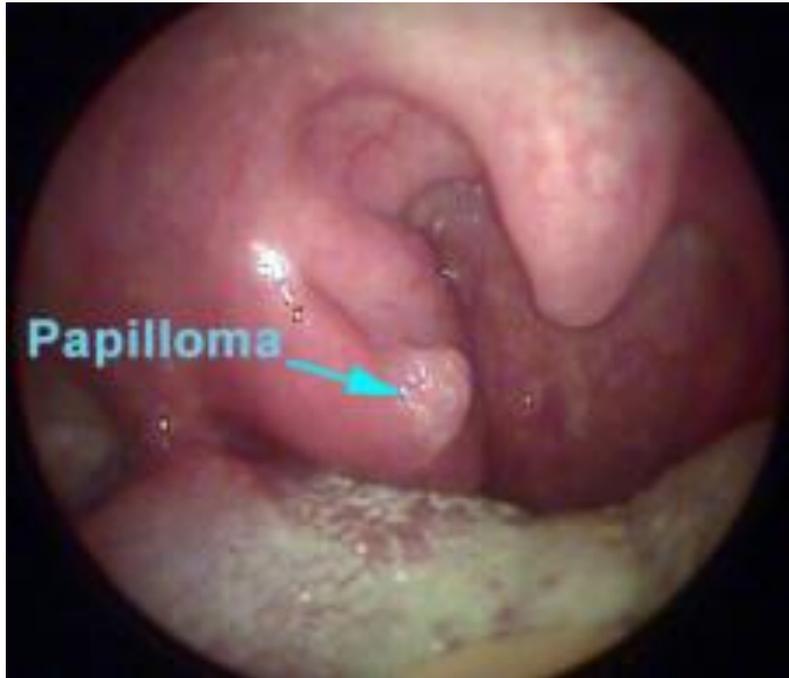
# Oral Health and HPV



# Human Papillomavirus

- HPVs are DNA viruses that infect the stratified epithelium (basal cells) of the skin or mucous membranes.
- There are more than 100 types of HPVs, which are categorized according to the type of cells they infect and ability to induce cellular changes.
- Usually categorized as Low Risk or High Risk
- Among the sites of HPV associated cancers occurring annually in the U.S., the oropharynx is the second most common area after the cervix.
- HPV appears to have a preference for the lymphoepithelial tissue of the Waldeyer ring, most notably the lingual and palatine tonsils.

# Intraoral HPV



# Oral Sex, Oral Cancer, and HPV Infection

- Recent emphasis placed on the potential links between oral sex, HPV infection, and oral cancer development.
- Worldwide, more than half of the 650,000 patients with head and neck cancer each year will die within 12 months
- Established link with HPV and oral cancer
  - Particularly the strains HPV 16 and HPV 18

# HPV / Patient Education / Q & A

- What head and neck cancers can be caused by HPV?
  - Cancers in the back of the throat, especially the base of the tongue and tonsils are the most common head and neck cancers that are caused by HPV.
- Should I be tested for oral HPV infection?
  - Right now, there is no test approved by the FDA for detection of oral HPV infection. Future studies will determine tools that can be used to detect HPV intraorally.
- How do you get oral HPV infection?
  - The same types of HPV that infect the genitals also can infect the mouth and throat. These types generally are referred to as oral HPV. Oral HPV is thought to be transmitted by skin to skin contact during oral sex. It also may be passed on during open mouthed or “French” kissing.
- Can HPV vaccines prevent oropharyngeal cancers?
  - The HPV vaccines on the market were developed to prevent cervical cancer. However, the same types of HPV that cause most cervical cancers can cause oropharyngeal cancers. It is possible that these vaccines also help prevent some of these cancers. However, preventing HPV infection will not eliminate other risk factors linked to these cancers, such as tobacco and alcohol use.

Integration = Cost Reduction



# Aetna's Data Warehouse Analysis - 2006

- Periodontitis treatment groups had a lower retrospective risk for their chronic condition than patients without periodontitis treatment.
- Recommend examination of the oral cavity for patients with diabetes, coronary artery disease, and cerebrovascular disease.
- Found a need for periodic dental visits for patients with diabetes and cardiovascular disease
- Patients with periodontitis had a higher cost per member per month than patients with gingivitis, other dental diagnosis or no dental diagnosis

# United Healthcare: Medical Dental Integration Study - 2013

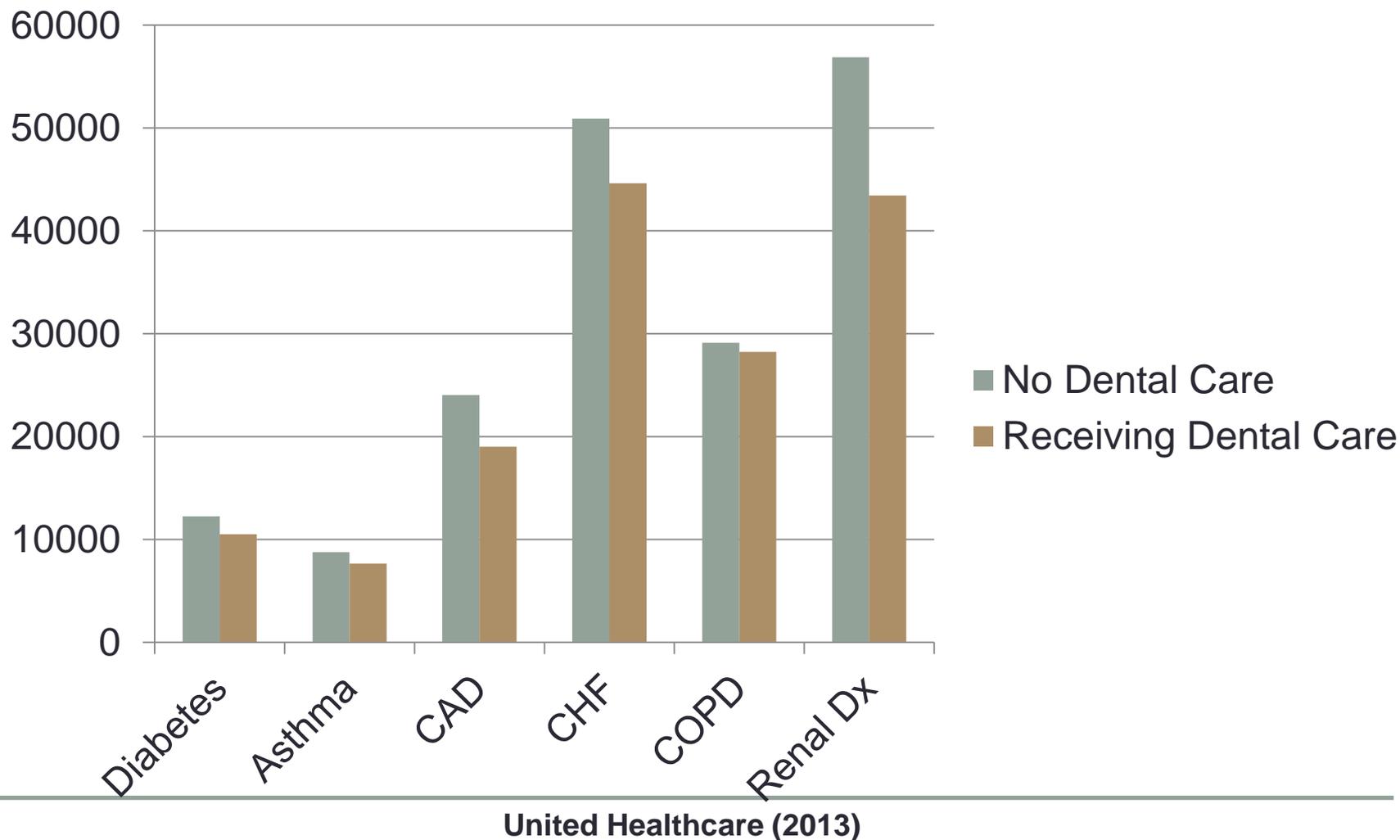
- Study compares the medical and pharmacy costs of individuals with six chronic medical conditions with the dental treatment they receive to determine if there is a difference in total health care costs associated with dental treatments.
  - Diabetes
  - Asthma
  - Congestive Heart Failure
  - Coronary Artery Disease
  - Chronic Obstructive Pulmonary Disease
  - Chronic Kidney/Renal Failure

# United Healthcare:

## Medical Dental Integration Study - 2013

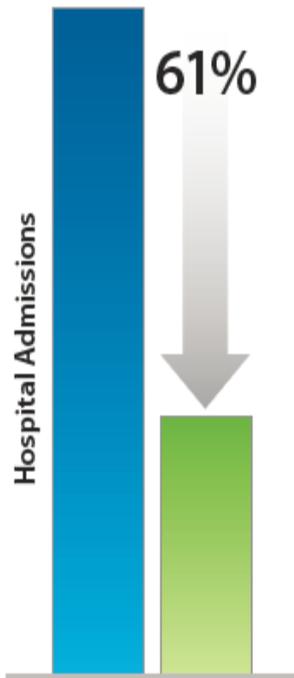
- Utilized 3 years of dental claims experience with 2 years of United Healthcare Evidence Based Medicine and episode treatment group claims analysis.
- Summary
  - Net medical costs (including pharmacy costs) for members who received dental care was on average **\$1,037** lower **per individual** than medical costs for members not receiving care, after adjusting for extra expense of dental care.
  - The largest medical savings (\$1,849) were for members who were not medically compliant with their disease management program.
  - Biggest impact related to members who received frequent cleanings and/or periodontal maintenance.

# United Healthcare: *[Non-Med Compliant]* Medical Dental Integration Study - 2013

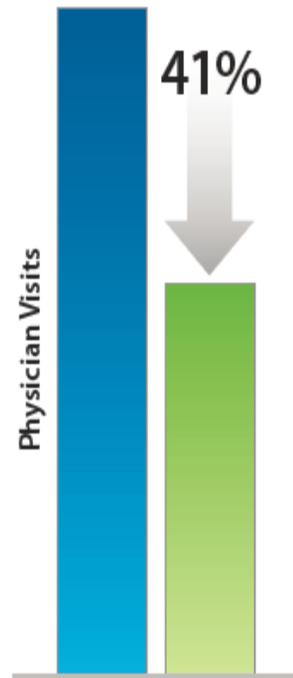


# Integrated Model (Cost Effective)

Reduction in Hospital Admissions



Reduction in Physician Visits



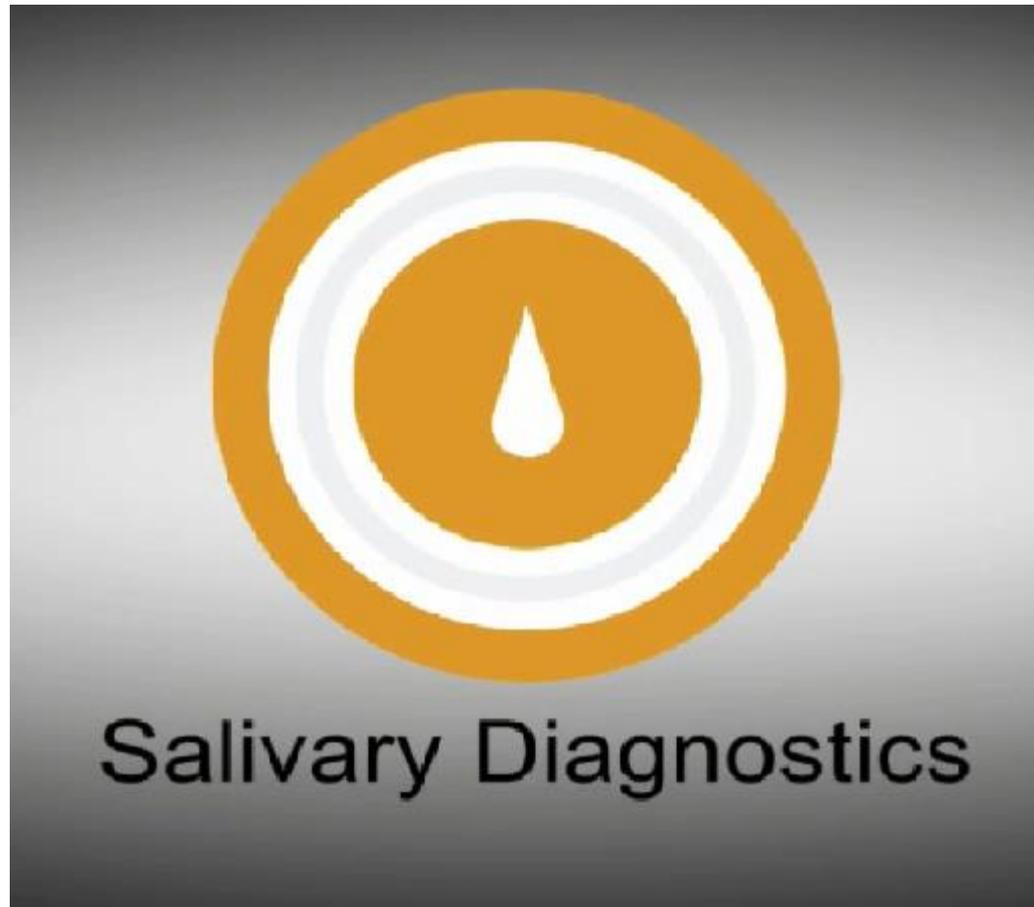
Reduction in Medical Costs



Study of individuals with diabetes who received:

-  No Periodontal Treatment
-  Periodontal Treatment

# The Future: Salivary Diagnostics



Salivary Diagnostics

# Saliva

- The mechanism of the saliva to blood / blood to saliva entry is by transcellular, passive intracellular diffusion and active transport, or paracellular routes by extracellular ultrafiltration within the salivary glands or through the gingival crevice
- Saliva is a complex fluid containing
  - A library of hormones
  - Proteins
  - Enzymes
  - Antibodies
  - Cytokines
  - Antimicrobial constituents
  - Serum and blood derivatives
  - Bacteria and bacterial by products
  - Bronchial and nasal secretions

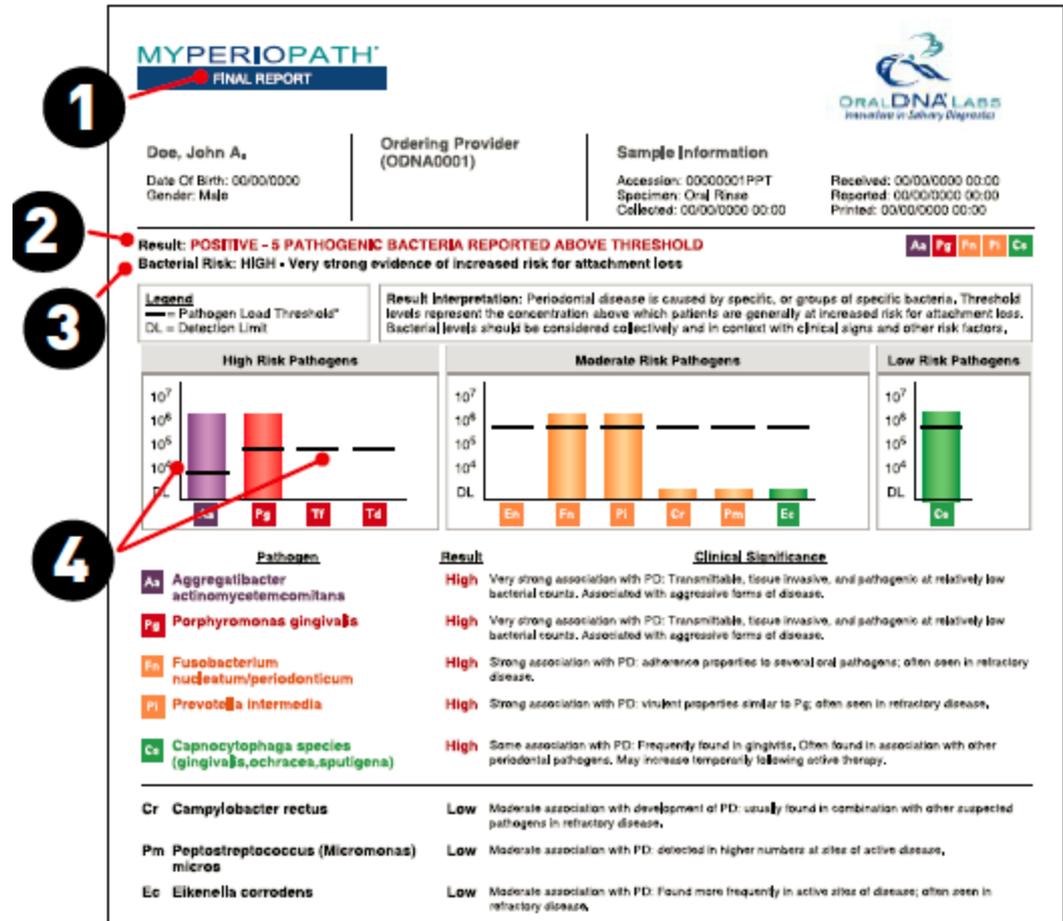
Diseases	Biomarkers
Autoimmune diseases Sjogren's syndrome Multiple sclerosis Sarcoidosis	Lactoferrin, beta 2 microglobulin, lysozyme C, cystatin C, salivary amylase, and carbonic anhydrase IgA production Alpha-amylase and kallikrein
Cardiovascular markers	Cardiac toponins, C reactive protein, myoglobin, myeloperoxidase, ICAM-1; CD 40; and salivary lysozyme
Dental caries and periodontal disease	Streptococcus mutans and lactobacilli count; aspartate aminotransferase, alkaline phosphatase; uric acid, albumin; pIgR, Arp 3; CA VI, IL-1Ra, PIS-2, LEI, and IGJ
Diseases of adrenal cortex	Salivary cortisol
Forensic evidence	DNA
Cystic Fibrosis	Cathepsin D, sodium, potassium, chloride, calcium, magnesium and lactate dehydrogenase
Ectodermal dysplasia	Inorganic constituents, total protein
Malignancy	lnc RNA; miRNA, CCNi, EGFR, FGF19; FRS2; and GREB1; AGPAT1, B2M; BASP2; IER3; and IL1B, p53; CA15-3 and approximately 20 other markers
Renal Disease	Cortisol, nitrite, uric acid, sodium chloride, pH, alpha-amylase, and lactoferrin. Salivary phosphate serum creatinine.
Human Papilloma Virus	HPV assays: tests available now specific to HPV 16 and HPV 18

# Testing Process

- Usually involves a lab specific test kit with all materials and supplies needed to complete the salivary test
- Very simple procedure:
  - Patient swishes a saline solution for 30 seconds
  - Patient expectorates into funneled collection tube
  - Funnel is removed, cap is secured to top of collection tube
  - Samples are sent via pre-paid FedEx/UPS envelope to Labs for analysis
  - E-mail notification is sent to clinician when electronic result report is available

# Salivary Diagnostic Reports

- ORALDNA
  - PerioPath



# Salivary Diagnostic Reports

- OralDNA
  - HPV Risk Analysis

FINAL REPORT



Doe, Jane P.  
Date Of Birth: 01/01/1988  
Gender: Female

Ordering Provider

Sample Information

Accession: 8008531  
Specimen: Oral Rinse  
Collected: 11/28/2009 19:39

Received: 11/30/2009 19:39  
Reported: 12/01/2009 21:12  
Printed: 12/01/2009 21:12

**Result: POSITIVE - HIGH RISK HPV IDENTIFIED**

**16 18**

HPV Type(s) Identified	Patient Risk
Mixed Types	High

Type	Clinical Significance
16	This HPV Type is classified as being of <b>high</b> risk for the development of cancer.
18	This HPV Type is classified as being of <b>high</b> risk for the development of cancer.

Test Information	
Reason for test:	Presence of Lesion
Lesion Size:	40mm x 50mm
Lesion Color:	Red
Lesion Location:	Soft Palate
Additional Clinical	

# Salivary Diagnostic Reports

- ORALDNA
  - MyPerioID Test

## FINAL REPORT



### Patient3, 3 (Id: 333333)

Date Of Birth: 05/06/1965  
Gender: Female  
Reason for Testing: Patient with signs and symptoms of periodontal disease

### Ordering Provider

### Sample Information

Accession: 33333333  
Specimen: Oral Rinse  
Collected: 04/29/2013 11:13

Received: 04/30/2013 11:13  
Reported: 05/01/2013 22:30  
Printed: 05/03/2013 13:28

### Periodontal Inflammation Risk

**HIGH**

### Results:

MyPerioID Genotype **G**/**G**

### Interpretation:

This individual's interleukin 6 genotype (IL6) is G/G. This MyPerioID result indicates your patient has a high risk for periodontal inflammation due to the genetic variation examined in this test.

### Comments:

- **Significance:** The prevalence of the G/G genotype is reported to be higher in individuals with moderate to severe chronic periodontitis and aggressive periodontitis than in individuals with no

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Questions???