



*Serving Every Patient, Every Month*

## **THE SYSTEMIC LINK: Bacteria In The Oral Cavity Linked To Disease**

*“Approximately one in 10 cases of death from pneumonia in elderly nursing home residents may be prevented by improving oral hygiene.”*

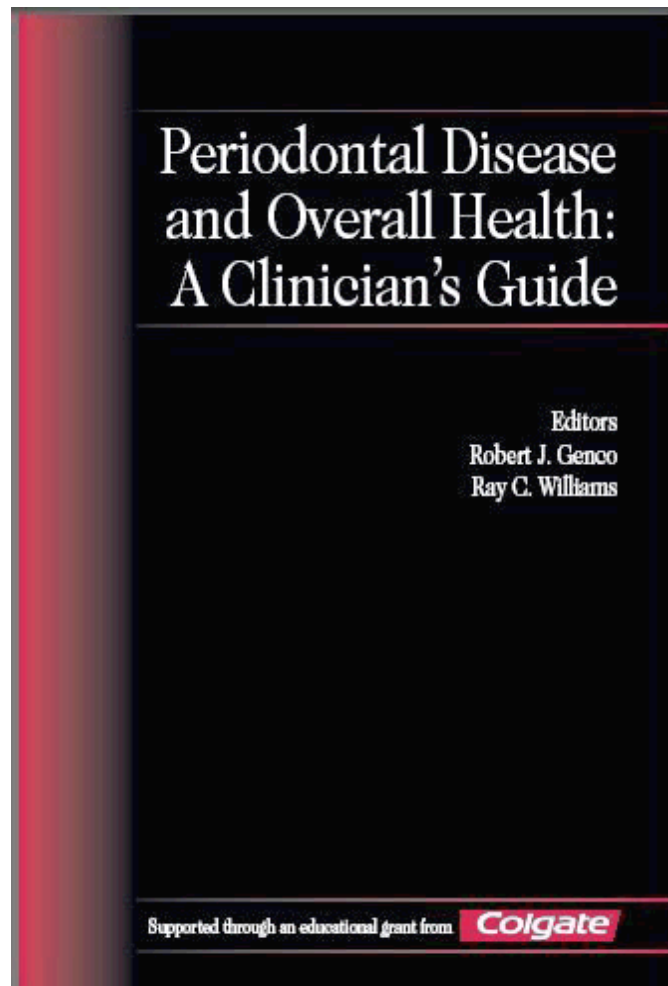
### **PROGRESS IN GERIATRICS**

A Systematic Review of the Preventive Effect of Oral Hygiene on Pneumonia and Respiratory Tract Infection in Elderly People in Hospitals and Nursing Homes: Effect Estimates and Methodological Quality of Randomized Controlled Trials Petteri Sjogren, DDS, PhD, \* Erika Nilsson, DH, t Marianne Forsell, DDS, Taile Johansson, PhD, :t and Janet Hoogstraate, PhD§

JAGS 56:2124-2130, 2008 © 2008, Copyright the Authors Journal compilation © 2008, The American Geriatrics Society 0002-8614/08/\$15.0070 JAGS NOVEMBER 2008-VOL. 56, NO. 11 METHODS Literature Searches Literature searches were conducted in the MEDLINE database (April 2007-November 2007)

The PrevMED  
ORAL HEALTH  
MAINTENANCE<sup>©</sup>  
PROGRAM

## Periodontal Disease and Overall Health: A Clinician's Guide



<http://www.colgateprofessional.com/professionaleducation/Periodontal-Disease-and-Overall-Health-A-Clinicians-Guide/article>

## Contents

Geriatric Health Home

Why Oral Health?

Diabetes

Atherosclerosis

Respiratory Disease

Monthly Service and Supportive Periodontal Therapy

The Oral Health Maintenance Program

### **TREATMENTS**

Atraumatic Restorative Treatment

Intermediate restorative Treatment

10% PVP iodine

Doxycycline

Xylitol

Chlorhexidine

### **CONTRIBUTORS**

Elena Connolly

Allen Finkelstein DDS

Talya Mintz DDS

Reviewed by Jonathan Musher MD, CMD

# Geriatric Health Home

*“The life span of any civilizations can be measured by the respect that is given to its elderly citizens. Those societies which treat the elderly with contempt have the seeds of their own destruction within them”*

- A.Toynbee

## **Paradigm Shift**

The Geriatric Health Home model is an integrated collaborative delivery system designed for long care facility residents. This multidisciplinary approach requires a paradigm shift in dental health care from a surgical invasive approach to a preventive non-invasive interdisciplinary approach. The Geriatric Health Home model is built on evidence-based practice outcomes. This model supports the use of risk-based interventions.

The Health Home model supports this philosophy and allows for changes within the current structure that will be needed to achieve the desired paradigm shift in dental care for the frail and elderly.

## **Oral Health**

Nearly thirty three percent of senior adults who have their teeth have untreated tooth decay or caries and fifty six percent of the adults have untreated periodontal disease. The treatment, management and prevention of oral disease will result in the reduction of oral related pain, weight loss and increase function that will improve their overall health and well-being. When oral infections arise and go untreated, seniors face heightened risk factors for diabetes mellitus, cardiovascular disease and respiratory disease.

## **The Oral Systemic Link**

The review of oral health linkages with general health reveals implications for the clinical practice of both medicine and dentistry. The recognition of well-known and established signs

and symptoms of oral diseases may assist in the early diagnosis and prompt treatment of some systemic diseases and disorders. Periodontal disease is a chronic inflammatory disease caused by the bacteria of dental plaque that results in biofilm formation. Periodontal disease results in the progressive destruction of the tissues that support the teeth namely the gingivae, the periodontal ligament and underlying bone.

The prevalence of chronic disease increases with age. Consistent with this prevalence is often substantial morbidity and mortality. Co-morbidities are frequently coexistent and complex requiring collaborative management of the elderly.

## **Diabetes**

Oral pathogens may increase insulin resistance when released into the circulatory system in the presence of periodontal disease. Any lowering of blood glucose may enhance the onset and progression of diabetes.

Health professionals must relate the presence of periodontal disease to possible systemic disorder such as poor healing of periodontal disease may alert them to the presence of diabetes. Likewise, know diabetes must be better managed for successful oral health treatment outcomes.

## **Cardiovascular Disease**

Poor oral health may contribute as a significant risk factor in the elderly by being a beginning inflammatory source for to cardiovascular disease. Serum inflammatory markers such as C-Reactive Protein have been shown to be predictive of mortality rates and functional decline in Skilled Nursing Facility. (Rueben, D.B. et al., Journal of American Geriatric Society, 2002).

Oral bacteria that cause periodontal disease enter the blood stream and embed in blood vessel. Endotoxins stimulate hosts cells to

produce inflammatory mediators and result in the liver releasing C-Reactive Protein.

### **Respiratory Diseases**

Respiratory diseases such as Chronic Obstructive Pulmonary Disease [COPD] and pneumonia have special relevance in the geriatric nursing home population. This population has increased chest wall stiffening and loss of elastic recoil resulting in decreased lung capacity and function.

Bacteria that are found in periodontal disease can be aspirated into the lungs to cause respiratory diseases such as pneumonia. Nursing home associated pneumonia (NAP) is the most common infection effecting nursing home residents. Pneumonia and Chronic Obstructive Pulmonary Disease is the number one reason for hospital transfers and one leading causes of morbidity and mortality for residents in Skilled Nursing Facilities.

In a 2006 article published in the Journal of Periodontology by Azarpazhooh and Leake, treatment aimed at reducing the oral microbial burden reduces risk of pneumonia for nursing home residents. There is good evidence that improved oral hygiene and frequent professional oral health care reduces the progression or occurrence of respiratory diseases in high-risk elderly adults living in long term care facility.

### **Polypharmacy**

The geriatric population living in long term care facilities is prescribed an average of eight drugs. The oral health relations and the influences of these medications are essential to providing quality geriatric health care. There are currently more than 42 drug categories comprising 400 drugs that have xerostomia or dry mouth as side effects: antidepressants, antibiotics, antispasmodics, analgesics, anticonvulsants, antihistamines, antihypertensives, diuretics and sedatives.

Judicious application of drug therapies by medical and dental providers as well as heightened awareness of potential adverse oral effects is necessary to providing quality care for the Skilled Nursing Home residents. The relationship of drug induced xerostomia to systemic and local factors including lesions of the oral mucosa have to be approached by all health care professionals.

### **Oral Cancer**

The lack of proper screening and early diagnosis for oral cancer will have significant consequences on residents living in long term care facilities. Oral cancer is often painless in the early stages and therefore it is essential that oral cancer screening be incorporated with soft tissue examination. The incidence of oral cancer in the geriatric population is greater than any other age group. When oral lesions are detected early the survival rate is approximately eighty percent but when oral cancer is detected late, the survival rate is only twenty two percent.

### **Oral Health Preventive & Maintenance Program**

Minimal invasive dentistry in a Skilled Nursing Facility or Long Term Care Facility is an evidenced based approach whereby the disease is controlled by the dentist and oral health team. The components of this approach are to conduct an oral risk assessment with focus on early detection, prevention and monitoring with surgical intervention utilized only as an end state treatment option. Treatment options must be based on the resident's comprehensive health care needs that include their identified barriers to oral health care to include: physical disabilities decreased sensory function and emotional disabilities.

In Health Home model residents must be seen on regular intervals based on their oral health risk assessment. Care for urgent care, preventive care and re-evaluation are the resident centered approach to quality integrated health care.

### Geriatric Health Home

To achieve the establishment of a Geriatric Home there is a need for epidemiological research on oral-general health risks and linkages. The oral health care systems capacity must be built and reshaped based on age and disability for the geriatric population. Improvement for integrated health and disease promotions in a public health setting must be shared by all health care professionals, third party payers and educational institutions. Educating health care professionals, older adults, caregivers and families on the geriatric health home are incorporated in the Health Home model. Improving health insurance with innovative integrated approaches for outcome based reimbursement are essential change models for the future.

**Allen Finkelstein DDS**  
**Chief Dental Officer**  
**PrevMED - Onsite Health Care Services**



## Why Oral Health?

*“More subtle and sinister are the medical consequences of PD, in which PD might set the stage for the patient’s experiencing diabetes mellitus, respiratory disease, stroke and myocardial infarcts.”*

JADA, Vol. 138 <http://jada.ada.org> September 2007 29S

Periodontal disease is one of the most common diseases among man. Dentists are no longer the only health professionals urging their patients to follow an oral health regime.

**Mounting evidence is emerging from various studies showing a distinct, positive link between oral health and systemic health.** The consensus is widespread, and comes from studies ranging from those conducted in an academic environment, to those financed with corporate funds by insurance giants like Aetna and Blue Cross Blue Shield.

According to the National Center for Health Statistics, the six leading causes of death in the United States in 2005 were as follows:

- 1.) Heart Disease (652,091 deaths)
- 2.) Cancer (559,312)
- 3.) Stroke/cerebrovascular diseases (143,579)
- 4.) Chronic lower respiratory disease (130,933)
- 5.) Unintentional accidental injuries (117,809)
- 6.) Diabetes (75,119)

**Five of these chronic diseases have been linked to periodontal disease.** Therefore, it is imperative to manage and improve oral health in order to concurrently promote and advance overall health.

**It is especially important for the elderly to adopt a thorough and complete oral health regime.** This is because studies have shown a drastic increase in the prevalence of periodontitis as age increases. Statistics compiled by Brown and Loe found that 36% of the adult population over the age of 19 has some degree of periodontal disease<sup>i</sup>. The number dropped to 29% when considering only those between the ages of 19 and 24, and increased to 44% in the population over the age of 45. **Results from a national survey conducted by the Center for Disease Control (CDC) showed an astonishing 89% of 80-year-old participants reported attachment loss  $\geq$  3 mm—a sign of periodontitis<sup>ii</sup>.**

**How can simple bacteria in the mouth pose such a threat to overall health?** The answer lays not in the bacterial biofilm so much as the body's host response to it. When excess plaque accumulates, it becomes a prime location for harboring bacteria. As the bacterial levels continue to rise, it initiates the body's auto-immune response. This inflammatory response produces cytokines and enzymes that have a destructive effect on the surrounding periodontal tissue. This can lead to detachment, the formation of deep pockets, and even bone loss if left untreated.

If bacteria still persist, they may enter the connective tissue and then the blood circulation, causing a systemic inflammatory response. This initiates a chain of events that inspire action from the liver and lymph nodes. Several different antibodies and biomarkers are released into the bloodstream that target the infection sight and are involved in fighting the bacteria.

The products of the pro-inflammatory response are associated with the diseases listed above.

**Evidence has shown that certain inflammatory biomarkers reach high levels years in advance of a patient's first heart attack.** These same markers were also shown to be highly predictive of a second heart attack, stroke, and death due to cardiovascular disease (CVD)<sup>iii</sup>.

**Systemic inflammation also has a very high association with Type 1 and Type 2 diabetes.**

In cases of diabetes, like in cases of CVD, certain biomarkers have been shown to be a predictor of developing the disease later on. One example is white blood cell levels. Over a period of 20 years, those with white blood cell counts in the highest tertile were more likely to develop Type 2 diabetes<sup>iv</sup>. **Systemic inflammation may also lead to insulin resistance, which is also associated with Type 2 diabetes.**

**There has been another distinct link between oral health and respiratory disease.** The oral cavity can serve as a reservoir for bacteria.

**These bacteria can be easily aspirated into the lungs, making infection more likely.** This is especially common in patients with diminished swallowing capacity.

To combat the obvious health risks that accompany periodontal disease, a specific oral health regime must not only be established, but also carried out on a regular basis. **A study done by Loe et al. in 1965 showed that students who abstained from practicing oral hygiene for 10-21 days developed marginal inflammation of the gingiva (or gingivitis) due to plaque accumulation. The study also found that once oral hygiene was reestablished, health of the gingiva returned, eliminating the inflammation<sup>v</sup>.**

This is vital to the understanding of oral health for two reasons. **For one, it shows that after a mere 10 days, poor oral hygiene can have a negative impact on the surrounding gum and tissue.** As previously stated, this inflammation marks the beginning of a very destructive process, which can lead to the aggravation or worsening of several serious chronic diseases. **The second important aspect worth noting is that the inflammation was relieved after re-introducing an oral health practices.** In short, with the absence of an oral health regime, periodontal disease may start to develop in a little over a week. This phenomenon can be easily quelled by reintroducing oral hygiene. **This study has shown that for the preventative effects and positive overall health benefits to take hold, oral health must be maintained on a consistent and regular basis.**

If a patient is able to do this, the positive impact can be astounding. Not only can health be improved, but there are positive financial implications as well. Recently, insurance giant **CIGNA conducted a study** in tandem with several distinguished doctors from the likes of the **University of Pennsylvania School of Dental Medicine** and **University at Buffalo Schools of Dental Medicine**. Their main purpose was to analyze the effects oral health may have on reducing health care costs, to determine if adding dental care to diabetic patients' plans would prove economical.

Their main concern was saving money, and maintaining oral health proved a viable option for doing just that. **The study found that diabetic patients who received an initial treatment for gum disease and subsequent maintenance after that had lower overall costs than those who did not receive the regular maintenance. These savings were on average**

**23 percent, or \$2,483 lower each year per patient.**

“With the increase in the prevalence of diabetes, and great concern for our ever-increasing medical costs, this study suggests that periodontal therapy may help reduce the disease burden, as well as medical costs of treatment for patients with diabetes,” said Dr. Robert Genco.

After the findings, CIGNA launched its “Oral Health Integration Program.” **Currently, health care insurance customers who have certain conditions, like diabetes, are now eligible for a complete reimbursement of any out-of-pocket costs related to sustaining oral health with no increase in premium rates.** These procedures may include periodontal scaling, root planning, and any other type of maintenance. The program is expanding to include more conditions, and more customers.

#### **WHY ORAL HEALTH?**

<sup>1</sup> Janeway C, Traveres P, Walport M, Shlomchik M. *Immunobiology*. The immune system in health and disease. 5<sup>th</sup> Edition. Garland Publishing, New York; 2001:44

<sup>1</sup> Christan C, Dietrich T, Hagewald S, Kage A, Bernimoulin JP. White blood cell count in generalized aggressive periodontitis after non-surgical therapy. *J Clin Periodontol* 2002;29:201-206.

<sup>1</sup> Ridker PM, Silvertown JD. Inflammation C-reactive protein, and atherothrombosis. *J Periodontol* 2008;79:1544-1551.

<sup>1</sup> Pradhan AD, Manson JE, Rifai N, Buring JE, Ridker PM. C-reactive protein interleukin 6, and risk of developing type 2 diabetes mellitus. *JAMA* 2001;286:327-334.

<sup>1</sup> Loe H, Theilade E, Jensen SB. Experimental gingivitis in man. *J Periodontol* 1965;36:177-187.

## Diabetes

*“Treatment of PD improves glycemic control in diabetic patients.”*

JADA, Vol. 138 <http://jada.ada.org> September 2007 29S

Diabetes mellitus (DM) is a metabolic disease characterized by the inability to control glucose homeostasis. The key disturbance stems from the inability to produce insulin, to use insulin properly, or both. The disease affects 23.6 million people in the United States per 2007 estimates, equating to about 7.8 percent of the population. Prevalence increases with age, as it is estimated that 24% of the population over the age of 60 has the diabetes.

The disease itself poses serious risks to a patient’s overall health. Studies show that people with diabetes face a two-to-four times greater risk for developing heart disease and/or stroke when compared to those without the disease.

**Diabetes is unique in that it has a bi-directional relationship with oral health.** That is, the disease itself can lead to the development of periodontal disease, while the existence of gingivitis or periodontitis can actually contribute to poorer glycemic control. **This increases not only the risk for complications, but also the risk for developing diabetes initially.** It is important to understand the role that oral health may play in diabetes management in order to prolong quality health.

**When bacteria in the mouth enter the circulatory system, an overall systemic inflammatory burden is created.** This is the body’s natural response, and depending on the degree of the infection, requires involvement

from several organs including the liver, lymph nodes, and kidneys. Studies have shown that patients with diabetes actually have an enhanced inflammatory response which puts more stress on the body<sup>vi</sup>. This also means a higher level of the same inflammatory biomarkers released. **For example, in an animal model, when rats were injected with a specific periodontal pathogen into their connective tissue, there was prolonged inflammation and higher levels of inflammatory cytokines. Diabetic rats also had more significant and prolonged gingival inflammation<sup>vii viii</sup>.**

The increased inflammation and release of biomarkers has a prolific effect on glycemic control. TNF- $\alpha$ , IL-6, and IL-1 $\beta$  are cytokines released during inflammation. They have been shown to have important metabolic effects on glucose and lipids. They also are involved in insulin action. **In addition, chronic and low grade inflammation involving these same cytokines has been associated with the development of insulin resistance, diabetes itself, and its complications<sup>ix</sup>.**

These markers are important because high levels can serve as a predictor of developing the disease later on, even in healthy individuals. **Therefore, chronic inflammation due to periodontitis may make a patient more prone to diabetes even if they are otherwise healthy at the time.**

**There is direct evidence regarding periodontal infection and control of diabetes from studies using non-surgical methods of oral health practices. Out of the ten randomized clinical trials surveyed, six found a statistically significant effect of periodontal therapy on glycated hemoglobin.**

Studies have shown a direct link between glycemic control and oral health. Taylor et al. found that those with Type 2 diabetes under either “good” or “moderate” control **but had severe periodontitis were approximately six times more likely to have poor glycemic control after two-years** than those who did not have a problem with oral hygiene<sup>x</sup>. **In short, oral health maintenance can be an effective way for a diabetic patient to keep glycemic levels under control.**

Glycemic control is a very important aspect of diabetes management. In its absence, several serious complications may arise. Diabetes has been known to have a significant link to heart attack and stroke. Controlling glycemic levels can lower the risk for developing these types of complications. In the Diabetes Control and Complications Trial and The UK Prospective Diabetes Study, both found that attaining and maintaining good glycemic control can reduce the risk of microvascular complications and slow down its progression in patients with Type 1 and Type 2 diabetes. **Risk of fatal or nonfatal heart attack was also reduced by 16 percent**<sup>xi</sup>.

Further analysis showed that for every percentage point decrease of HbA1c, there was **a 25% reduction in diabetes related deaths, 7% reduction in all-cause mortality, and 18% reduction in heart attack**<sup>xii</sup>. Clearly, managing hemoglobin is an effective way of preserving health and limiting the risk for serious diabetic complications. **As previously stated, oral health maintenance is a simple yet viable option for doing so.**

In studies that analyzed the specific relationship between periodontal health and cardio-related complications in diabetics found convincing evidence supporting this notion. One study conducted by the **National Institute of Diabetes**

**and Digestive and Kidney Diseases** followed 628 individuals over a period of 11 years. **They found that those with the most severe cases of periodontal disease had 3.2 times greater risk for cardio-related mortality, when compared to those with levels considered moderate or lower**<sup>xiii</sup>. This elevated level of risk remained even after controlling for other factors related to cardio-renal mortality such as age, sex, duration of diabetes, HbA1c, body mass index, hypertension, blood glucose, cholesterol, electrocardiographic abnormalities, and smoking.

**In addition to linking periodontal disease with the emergence diabetic complications, there is strong evidence that shows a connection between poor periodontal health and developing Type 2 diabetes itself.** Demmer and colleagues investigated this very association using the National Health and Nutrition Examination Survey and its Epidemiologic Follow-up Study. The average follow-up period was over the course of 17 years, from 1971 to 1992. **They found that having periodontal disease was significantly associated with a 50-100% greater risk for developing Type 2 diabetes after controlling for other related risk factors**<sup>xiv</sup>.

Insurance company, Aetna teamed up with Columbia University to examine the connection, if any, between maintaining oral health and keeping insurance costs low. **The study found that diabetic customers with periodontitis had higher monthly health costs than those without oral disease. Additionally, the retrospective risk for chronic conditions like diabetes was lowered once the patient was treated for periodontal disease.**

**Diabetic patients would greatly benefit from a regular oral health regime.** It not only helps regulate and maintain glycemic control, but also helps protect from more serious complications in the future, such as heart attack or stroke. Healthy patients would also benefit from oral health maintenance, as it may prevent the development of diabetes later in life. Any individual with diabetes or at risk for diabetes should seriously consider the state of his or her periodontal health, and make a concerted effort to maintain good oral hygiene.

#### DIABETES

<sup>1</sup> Loos BG. Systemic markers of inflammation in periodontitis. *J Periodontol* 2005;76

<sup>1</sup> Graves DT, Naguib G, Lu H, Leone C, Hsue H, Krall E. Inflammation is more persistent in type 1 diabetic mice.

<sup>1</sup> Liu R, Bal HS, Desta T, Krothapalli N, Alyasi M, Luan Q, Graves DT. Diabetes enhances periodontal bone loss through enhanced resorption and diminished bone formation. *J Dent Res* 2006;85:510-514.

<sup>1</sup> King GL. The role of inflammatory cytokines in diabetes and its complications. *J Periodontol* 2008;79:1527-1534.

<sup>1</sup> Taylor GW, Burt BA, Becker MP, Genco RJ, Shlossman M, Knowler WC, Pettitt DJ. Severe periodontitis and risk for poor glycemic control in patients with non-insulin-dependent diabetes mellitus. *J Periodontol*. 1996;67

<sup>1</sup> The Effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. The Diabetes Control and Complications Trial Research Group. *N Engl J Med* 1993;329:977-986

<sup>1</sup> Genuth S, Eastman R, Kahn R, Klein R, Lachin J, Lebovitz H, Nathan D, Vinicor F; American Diabetes Association. Implications of the United Kingdom prospective diabetes study. *Diabetes Care* 2003;26

<sup>1</sup> Saremi A, Nelson RG, Tulloch-Reid M, Hanson RL, Sievers ML, Taylor GW, Shlossman M, Bennett PH, Genco R, Knowler WC. Periodontal disease and mortality in type 2 diabetes. *Diabetes Care* 2005;28:27-32. <sup>1</sup> Demmer RT, Jacobs DR, Jr., Desvarieux M. Periodontal disease and incident type 2 diabetes: results from the First National Health and Nutrition Examination Survey and its epidemiologic follow-up study. *Diabetes Care* 2008;31:1373-1379

## Atherosclerosis

*“For example, a case-control study found that men younger than 60 years who had severe periodontitis had a 4.3 times higher risk of experiencing stroke than did patients in the same age group who had mild or no periodontitis”*

JADA, Vol. 138 <http://jada.ada.org> September 2007 29S

Atherosclerosis is a condition that can lead to serious health conditions including heart attack or stroke. It is the result of the formation of plaques in the arterial walls. This formation is complex, and involves many underlying inflammatory molecules. If sufficiently advanced, blockages or reduced blood flow can lead to inadequate blood supply to a variety of organs. Coronary heart disease is the most common clinical syndrome of atherosclerosis, affecting over 17 million Americans as of a 2009 statistical update by the American Heart Association.

**Cardiovascular diseases remain the number one cause of death in the United States.** They account for over 2.45 million deaths, or 34.3% of all deaths, per year. The American Heart Association has estimated that 785,000 Americans will experience a heart attack in the year 2010. An additional 470,000 will experience a repeated episode, while another 195,000 will experience a first silent heart attack. About 610,000 new strokes will occur per year on top of 185,000 recurrent cases. Atherosclerosis is extremely prevalent in the US and also extremely dangerous.

The disease progresses from endothelial events at the microscopic level to full plaque development that can lead to growth and rupture. Inflammation plays an important role

in atherosclerosis, and underlies the process of plaque formation. Acute inflammatory processes are also likely to be involved with plaque rupture.

As in diabetes, many biomarkers of inflammation have been lined to pro-inflammatory cytokines that stimulate nuclear factor-kappa-beta pathway. This leads to increased production of cellular adhesion molecules, which may correlate with risk of developing plaques.

**Studies over the past two decades have shown a significant link between periodontal disease and atheromatous diseases. Meurman et al. reported a 20% higher risk for cardiovascular disease (CVD) among patients with periodontal disease and even higher risk for cerebrovascular disease<sup>xv</sup>.**

A study of Finnish individuals was conducted that followed a population of 102 control subjects. A Dental Severity Index score was used to determine progression of periodontal disease. **They found that those with signs of periodontal disease were 30% more likely to have myocardial infarction when compared to those without sign of oral infection. In a follow-up study, the same investigators found a significant link between dental infections and severe coronary atheromatosis in males<sup>xvi xvii</sup>.**

Another study followed 1,147 males aged 21-80 who were free of coronary artery disease (CAD). They also were assessed for periodontal disease by analyzing percent of alveolar bone loss using dental radiographs. **Over an 18-year period, 207 participants developed CAD, with 59 dying from CAD, and an additional 40 experiencing strokes. When graphing incidence of CAD with respect to periodontal disease, they discovered a linear relationship—increased**

**severity of periodontitis was met with increasing occurrences of cardiovascular disease<sup>xviii</sup>.**

DeStefano et al. studied the same relationship with 9,760 adults who were followed over a 14-year period. Several related variables were accounted for including age, gender, race, blood pressure, cholesterol levels, etc. **They found those who had periodontal disease were 25% more likely to develop CAD compared to those with minimal levels of the disease. Interestingly, males with periodontitis under the age of 50 were 72% more likely to develop CAD verses their counterparts<sup>xix</sup>.**

A similar study by Wu et al. looked at the same population, but analyzed the relationship between periodontitis and strokes. **They reported a two times higher risk of stroke when periodontal disease was present<sup>xx</sup>.**

**There is an obvious link between periodontal disease and Atherosclerosis. However, there is an equally important correlation between the introduction of dental treatment and subsequent decrease of risk.** Several human intervention trials support this thesis. D'Auito et al. showed that those treated with scaling and root planning had a reduction in CVD biomarkers like CRP and interleukin-6. **When patients showed a positive response to the oral health regimen, i.e. reduction of pocket depth, they were four times more likely to show decreases of CRP when compared to those who did not have such a response to treatment<sup>xxi</sup>.**

**Aetna teamed up with Columbia University** to analyze the relationship between periodontal disease and cardiovascular disease. The study inquired about the cause/effect relationship but also looked at the effect on health care costs.

**Their findings showed a significant drop in overall health costs in patients who had a regular oral health regime to the tune of 16% for those with coronary artery disease and 11% for those with cardiovascular disease.**

There was also a significant finding in that, those had periodontal treatment had significantly less risk for developing chronic conditions like CAD and CVD. **They found that patients who received dental treatment had a 19% lower risk for CAD and 17% lower risk for CVD.**

The consensus among insurance companies and academics alike, is that oral health not only has a preventative effect on the development of cardiovascular disease, but also may alleviate risk once introduced to the patient's routine.

#### **ATHEROSCLEROSIS**

<sup>1</sup> Meurman JH, Sanz M, Janket SJ. Oral health, atherosclerosis and cardiovascular disease. *Crit Rev Oral Biol Med* 2004;15:403-413.

<sup>1</sup> Matilla K, Nieminen M, Valtonen V, Rasi V, Kesaniemi Y, Syrjala S, Jungul P, Isoluoma M, Hietaniemi K, Jokinen M, Huttunen J. Association between dental health and acute myocardial infarction. *Br Med J* 1989;298:779-782.

<sup>1</sup> Matilla KJ, Valle MS, Nieminen MS, Valtonen VV, Hietaniemi KL. Dental infections and coronary atherosclerosis. *Atherosclerosis* 1993;103:205-211.

<sup>1</sup> Beck JD, Garcia R, Heiss G, Vokonas P, Offenbacher S. Periodontal disease and cardiovascular disease. *J Periodontol* 1996;67:1123-1137.

<sup>1</sup> DeStefano F, Anda RF, Kahn HS, Williamson DF, Russell CM. Dental disease and risk of coronary heart disease and mortality. *Br Med J* 1993;306:688-691.

<sup>1</sup> Wu T, Trevisan M, Genco RJ, Ralkner KL, Dorn JP, Sempos CT. An examination of the relation between periodontal health status and cardiovascular risk factors. Serum total and HDL cholesterol, C-reactive protein, and plasma fibrinogen. *Am J Epidemiol* 2000;85:180-189.

<sup>1</sup> D'Aiuto F, Ready D, Tonetti MS. Periodontal disease and C-reactive protein-associated cardiovascular risk. *J Periodontol Res* 2004;39:236-241.

## Diseases of the Respiratory Tract

*"There is evidence that the genetic identity of respiratory pathogen isolates recovered from bronchoalveolar lavage fluid of elderly people who are hospitalized or institutionalized is the same as isolates from their dental plaques"*

JADA, Vol. 138 <http://jada.ada.org> September 2007 30S

**There is an emerging correlation between oral health and the contraction of respiratory infection.** The unique proximity of the oral cavity and respiratory tract and lungs has made this connection the subject of much inquiry. Respiratory disease comes in many forms including **community-acquired pneumonia (CAP)**, hospital-acquired pneumonia (HAP), the related ventilator-associated pneumonia (VAP) and **Nursing Home Acquired Pneumonia (NHAP)**, and chronic bronchitis—**each of which being linked to periodontitis.**

Pneumonia is an infection of the lungs caused by virus, bacteria, fungi, or parasites. Bacterial pneumonia is particularly dangerous and can have devastating residual effects ranging from higher medical costs, to decline of quality of life, and mortality.

CAP is relatively common and affects about 4 million people in the United States per year. It accounts for 600,000 hospitalizations, 64 million days of restricted activity, and 45,000 deaths per year<sup>xxii</sup>. Development of CAP is especially problematic for seniors. One study evaluated the one year mortality rate of 158,960 elderly CAP patients compared to 794,333 control subjects hospitalized for something other than CAP. They found that the single-year mortality

rate for CAP patients was 40.9% versus only about 29% for the control group. CAP poses a real health threat to those affected, especially those higher in age<sup>xxiii</sup>.

**Aspiration pneumonia is initiated by the inhalation of oropharyngeal secretions colonized by pathogenic bacteria. This type is very common in a nursing home setting. It poses the highest risk under circumstances if increased aspirate volume, and especially in cases of elevated organism levels found in the aspirate.**

HAP is commonly characterized by pneumonia that appears within 48 hours of being hospitalized. **There is a related type, nursing home associated pneumonia (NHAP), whose high mortality rate makes it very important to evaluate.** It is also a **very common cause for hospitalizations among the elderly. One bout with HAP can add up to 6 extra days of hospitalization and thousands of dollars in medical costs. The mortality rate can be as high as 25%**<sup>xxiv</sup>.

**NHAP is specific to the nursing home or institutionalized setting.** One study of 666 nursing home patients found that respiratory infections accounted for about half of all infections among the population (47%)<sup>xxv</sup>. Respiratory disease is the leading cause of acute hospitalizations, about 21%, and NHAP can account for up to 45% of all respiratory related hospital admissions<sup>xxvixxvii</sup>.

**There are several means of linking oral health to pneumonia.** For one, the oral cavity can serve as a reservoir for bacteria. **Dental plaque harbors many of the same bacteria that cause pneumonia.** This dental plaque is also involved in the development of periodontal disease. **Bacteria can be easily released from this**

**plaque into oral secretions, and aspirated into the lungs.** Those at the highest risk include patients who have lost the ability to swallow, those with limited salivary flow, or decreased cough reflex.

**In fact, aspiration of saliva has been shown as the main avenue for bacteria to enter the lungs among the institutionalized elderly**<sup>xxviii</sup>. **Another study involving 613 nursing home patients showed a strong association between difficulty swallowing and poor oral health and the development of pneumonia**<sup>xxix</sup>.

The detachment associated with periodontitis leaves pockets where bacteria can easily colonize leads to increased levels of respiratory pathogens, which may serve to promote pneumonia.

Further studies have shown a distinct relationship between the bacteria found in the oral cavity and the bacteria found in an infected lung. Strains of bacteria recovered from lung fluid were compared to those found in the dental plaque of a critically ill patient. **Using a pulse-field gel electrophoresis, it was determined that 9 respiratory pathogens were genetically identical to the corresponding bacteria found in the dental plaque**<sup>xxx</sup>. **“This is the first study to establish unequivocally a link between dental hygiene and respiratory infection,”** said Dr. Ali A. El-Solh, the leading researcher on the study<sup>xxxi</sup>.

The severity of respiratory disease has been shown to be quelled by oral intervention. **For example, the use of chlorhexidine was shown to reduce pneumonia for ventilated patients and it may also lessen the need for intravenous antibiotics.** It also may delay the contraction of ventilator-associated

pneumonia<sup>xxxixxxiii</sup>. Anti-microbial gels were also shown to reduce VAP.

**Non-ventalized patients may also see a benefit from improved oral care.** Elders living in nursing homes are a prime demographic to analyze due to their susceptibility to both pneumonia and periodontal disease. **A daily regimen of tooth brushing and topical antimicrobial swabs was shown to significantly decrease episodes of pneumonia among residents in long-term care facilities. One study followed 141 nursing home patients and found that professional cleaning by a hygienist once a week significantly reduced incidents of fever and deadly pneumonia<sup>xxxiv</sup>.**

Despite an obvious need for oral care in at-risk patients, one study found that appropriate oral health procedures were not being used frequently in critical-care settings. This was the norm even though 92% of the 556 respondents said that oral care should be a high priority<sup>xxxv</sup>. The suggested method of cleaning includes tooth brushing at least twice daily, accompanied by the use of antiseptic rinses such as **chlorhexidine**.

More prudent measures are suggested to any vulnerable patient. These steps include:

- 1.) Remove all dental appliances upon admission to the critical care unit
- 2.) Conduct oral examination initially and daily by a registered nurse
- 3.) Brush teeth two or three times per day; also floss if possible
- 4.) Rinse all oral surfaces with antimicrobial rinses
- 5.) Perform frequent deep suction or oral and pharyngeal secretions as needed, as well as prior to repositioning the tube or deflating the cuff
- 6.) Remove hard deposits from the teeth if possible.

- 7.) Request that teeth be professionally cleaned before admission to the hospital or elective procedures.

#### **DISEASES OF THE RESPIRATORY TRACT**

<sup>1</sup> Jackson ML, Neuzil KM, Thompson WW, Shay DK, Yu O, Hanson CA, Jackson LA. The burden of community-acquired pneumonia in seniors: results of a population-based study. *Clin Infect Dis* 2004; 39:1642-1650

<sup>1</sup> Kaplan V, Clermont G, Griffin MF, Kasal J, Watson RS, Linde-Zwirble WT, Angus DC. Pneumonia: still the old man's friend? *Arch intern Med* 2003; 163:317-323

<sup>1</sup> Rello J, Ollendorf DA, Oster G, Vera-Llonch M, Bellm L, Redman R, Kollef MH; VAP Outcomes Scientific Advisory Group. Epidemiology and outcomes of ventilator-associated pneumonia in a large US database. *Chest* 2002; 122:2115-2121.

<sup>1</sup> Robert R. Muder; Richard V. Aghababian; Mark B. Loeb; Jerald A. Solot; Martin Higbee

<sup>1</sup> Feuerberg MA, Mortimore EF, Kramer AM. HCFA study on appropriateness of minimum nurse staffing ratios: interim report. Baltimore (MD): Health Care Financing Administration; 1996

<sup>1</sup> Hutt E, Ecord M, Eilertsen TB, et al. Precipitants of emergency room visits and acute hospitalization among short-stay Medicare nursing home residents. *J Am Geriatr Soc* 2002;50:223-9

<sup>1</sup> Langmore SE, Terpenning MS, Schork A, Chen Y, Murray JT, Lopatin D, Loesche WJ. Predictors of aspiration pneumonia: how important is dysphagia? *Dysphagia* 1998;13:6-81.

<sup>1</sup> Quagliarello V, Ginter S, Han L, Van Ness P, Allore H, Tinetti M. Modifiable risk factors for nursing home-acquired pneumonia. *Clin Infect Dis* 2005;40:1-6.

<sup>1</sup> El-Solh AA, Pietrantonio C, Bhat A, Okada M, Zambon J, Aquilina A, Berbary E. Colonization of dental plaques: a reservoir of respiratory pathogens for hospital-acquired pneumonia in institutionalized elders. *Chest* 2004;126:1575-1582

<sup>1</sup> "Pathogens in Dental Plaque Implicated in Development of Pneumonia in Hospitalized Elderly - UB NewsCenter." *University at Buffalo*. N.p., 30 Nov. 2004. Web. 1 July 2011.

<<http://www.buffalo.edu/news/7020#>>.

<sup>1</sup> Koeman M, van der Ven AJ, Hak E, Joore HC, Kaasjager K, de Smet Ag, Ramsay G, Dormans TP,

Aarts LP, de Bel EE, Hustinx WN, van der Tweel I, Hoepelman AM, Bonten MJ. Oral decontamination with chlorhexidine reduces the incidence of ventilator-associated pneumonia. *Am J Respir Crit Care Med* 2006;173:1348-1355.

<sup>1</sup> Grap MJ, Munro CL, Elswick RK Jr, Sessler CN, Ward KR. Duration of action of a single early oral application of chlorhexidine on oral microbial flora in mechanically ventilated patients: a pilot study. *Heart Lung* 2004;33:83-91.

<sup>1</sup> Adachi M, Ishihara K, Abe S, Okuda K, Ishikawa T. Effect of professional oral health care on the elderly living in nursing homes. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2002;94:191-195.

<sup>1</sup> Grap MJ, Munro CL, Ashtiani B, Bryant S. Oral care interventions in critical care: frequency and documentation. *Am J Crit Care* 2003;12:113-118.

## Is “Monthly Service” Often Enough?

In the absence of optimal oral hygiene, to prevent the presence of gingivitis would require prophylaxes to be done every two to three weeks. (Ramfjord 1987)

The cause and effect relationship between supragingival plaque and gingivitis was demonstrated by (Dr. Harold) Loe and his colleagues in 1965. When plaque was allowed to accumulate gingivitis developed within in 21 days. (Dr. Phyllis Beemsterboer, *Plaque & Calculus*, UCLA PIC)

In a later study done in 1986, Loe and his coworker found that in regard to periodontitis, not all people develop the disease to the same extent or even at all. Also, the inflammatory process could be halted and clinical health restored but the damage caused by periodontitis was not reversible. It is important to realize that genetic predisposition plays a role in the way people’s tissue responds to plaque and calculus and that susceptibility to periodontitis varies.

It has been established that a plaque free mouth is a basic requirement for periodontal

health and that the presence of supragingival plaque will result in gingivitis, and may lead to periodontal disease if present for a long period of time. (Ramfjord,S.P.; Morrison, EC et el J periodontal January 1982:53:23-30)

Moresque et al (1980) scaled and root planed and monitored sites in 14 periodontal patients. The results found indicated that a single session is capable of altering the proportions of certain bacteria forms. However, return of pathogens to pretreatment levels generally occurs in approximately 42 days.

Van Wenkelhoff et al (1987) observed the recolonization of deep periodontal pockets in 8 adult periodontitis patients after a single dose of supra and subgingival debridement. They found the total percent of spirochetes and P. gingivitis was reduced. However, absolute counts of these microorganisms were not changed at 8 weeks.

There is no clear answer in the literature regarding “Is monthly treatment enough” but it is clear that plaque formation leads to gingivitis and gingivitis often leads to periodontitis. There is enough information to conclude that, in a frail, at risk population, services to prevent the onset of gingivitis should be delivered at least every 30 days.

## Supportive Periodontal Therapy

Supportive Periodontal Therapy (SPT) is an extension of periodontal therapy (A Bowers DDS, MS: 2011). It is a compound of procedures performed at selected intervals to assist the periodontal patient in maintaining oral health. It is initiated and performed by a dentist or a dental hygienist under the supervision of a dentist. The therapeutic goal of SPT is to prevent the reoccurrence and progression of periodontal disease in patients who have previously been treated for periodontitis.



*Serving Every Patient, Every Month*

## Oral Health Maintenance<sup>®</sup> Program

The Oral Health Maintenance (OHM)<sup>®</sup> Program was developed by recognized leaders in the dental and medical fields led by a nationally recognized leader in the development of interdisciplinary care, Dr. Allen Finkelstein.

Dr. Finkelstein is the Chief Dental Officer of PrevMED. He was presented the prestigious Strusser Award in 2011 at the New York City College School of Dentistry in recognition for his leadership in developing the Geriatric Health Home. The goals of the Geriatric Health Home and the OHM<sup>®</sup> program is:

- Improve quality of life by improving overall health.
- Lower the risk of contracting systemic diseases such as Diabetes, Heart Disease and Pneumonia.
- Reduce costs of long term health care.

The only way to deliver these goals to our patients is to provide regular, routine treatment to help control bacteria in the oral cavity.

The OHM<sup>®</sup> delivers clinical services to Every Patient, Every Month. This frail population requires minimally, invasive, non-surgical, regular treatments. The goal is not restoration; the goal is comfort and improved health. PrevMED clinical providers utilize proven

treatments to meet the needs of the patient while minimizing patient trauma. Usually, these patients cannot or will not cooperate with the delivery of surgical solutions. These treatments are designed to generally meet the health needs of this geriatric, at risk population.

### **OHM<sup>®</sup> PHASE I - EVALUATE**

A dentist first evaluates the resident. The general condition of the oral cavity is determined at this assessment. A risk level is established and the existence of periodontal disease is determined. Also, the resident is evaluated regarding his/her ability to cooperate with the delivery of treatment.

### **OHM<sup>®</sup> PHASE II - STABILIZE**

The next step in the OHM program is to stabilize the oral cavity. In this phase the patient receives a COE, full radiographs, review of medical records by a dentist, plus a full mouth debridement/prophylaxis, fluoride varnish, antimicrobial treatment and minimally invasive restorative treatment materials. A treatment/maintenance plan is determined. The Dentist consults with the Facility Medical Director and/or attending physician to review the Treatment Plan.

Further, the Registered Dental Hygienist meets with the facility care staff to review oral care; why it is needed, how to deliver and products required.

### **OHM<sup>®</sup> PHASE III - MAINTAIN**

The final phase is maintenance of the oral cavity. The Treatment Plan is delivered monthly by the appropriate clinician. Medications and oral hygiene products are provided, regular meetings and training with clinicians and care givers are routinized to enhance care and outcomes.

The dental/physicians team consults to review outcomes and recommend changes in the Treatment Plan.

**Oral Health Maintenance<sup>®</sup> Program**  
**PrevMED Resident Initial Oral Assessment and Oral Risk Assessment**

| Month | CDT Code  | Services and Disposables   | Natural Teeth Oral Hygiene Products / Xerostomia Products based on Patient functionality and tolerability | Denture Oral Hygiene Products / Xerostomia Products based on Patient functionality and tolerability |
|-------|---|--|---|---|
| 1 #   | D0150   | Comprehensive Oral Evaluation  | Rotary Toothbrush   | Denture Cup   |
|       | D0210   | Complete Intraoral X-Ray Series  | Regular Toothbrush  | Denture Brush   |
|       | D7288   | DDS Brush Biopsy (If Indicated)  | Toothpaste  | Mouthwash   |
|       |   | DDS review for Doxycycline, Antibiotic Therapy, MI Paste, 10% Povidone Iodine, Chlorhexidine, Periodex and Xerostomia Products | Mouthwash   | Denture Cleaning Tablets  |
|       |   | DDS Oral Risk Evaluation, Polypharmacy Review, and Soft Tissue Evaluation  | Flossers  | Denture Adhesive  |
|       | D2999   | Atraumatic Restorative Treatment per tooth surface as needed   | Tongue Cleaner  | Tongue Cleaner  |
|       |   |  | Toothettes  | Hand Wipes  |
|       | D2940   | Intermediate Restorative Sedative Filling Material per tooth surface as needed   | Hand Wipes  | Xylitol Mouth Spray   |
|       | D4381   | Localized delivery of antimicrobial agents   | Xylitol Mouth Spray   | Xylitol Lollipops   |
|       | D9410   | Visit to Skilled Nursing Facility  | Xylitol Lollipops   | Xylitol Mints   |
|       | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Xylitol Mints  |   |   |
|       | D1330   | Oral Hygiene Instructions  |   |   |
| 2 #   | D0120   | Periodic Examination   | Regular Toothbrush  | Denture Cup   |
|       | D4355   | Full Mouth Debridement   | Toothpaste  | Denture Brush   |
|       | D1206   | Fluoride Varnish   | Mouthwash   | Mouthwash   |
|       | D9630   | 10 % Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products  | Flossers  | Denture Cleaning Tablets  |
|       | D1330   | Oral Hygiene Instructions  | Tongue Cleaner  | Denture Adhesive  |
|       | D5899   | Denture Ultrasonic Cleaning  | Toothettes  | Tongue Cleaner  |
|       | D9630   | Oral Hygiene Home Care Products  | Hand Wipes  | Hand Wipes  |
|       |   |  | Xylitol Mouth Spray   | Xylitol Mouth Spray   |
|       |   | Xylitol Lollipops  | Xylitol Lollipops   |   |
|       |   | Xylitol Mints  | Xylitol Mints   |   |
| 3 #   | D0120   | Periodic Examination   | Regular Toothbrush  | Denture Cup   |
|       | D1110   | Prophylaxis or Full Mouth Debridement if needed  | Toothpaste  | Denture Brush   |
|       | D1206   | Fluoride Varnish   | Mouthwash   | Mouthwash   |
|       |   | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products  | Flossers  | Denture Cleaning Tablets  |
|       | D1330   | Oral Hygiene Instructions  | Tongue Cleaner  | Denture Adhesive  |
|       | D5899   | Denture Ultrasonic Cleaning  | Toothettes  | Tongue Cleaner  |
|       | D9630   | Oral Hygiene Home Care Products  | Hand Wipes  | Hand Wipes  |
|       |   |  | Xylitol Mouth Spray   | Xylitol Mouth Spray   |
|       |   | Xylitol Lollipops  | Xylitol Lollipops   |   |

**PrevMED**  
**12 Month Oral Health Maintenance<sup>®</sup> Program**

| <b>Month</b> | <b>CDT Code</b> | <b>Services and Disposables</b>   | <b>Natural Teeth Oral Hygiene Products / Xerostomia Products based on Patient functionality and tolerability</b> | <b>Denture Oral Hygiene Products / Xerostomia Products based on Patient functionality and tolerability</b> |
|--------------|-----------------|---|--|--|
| <b>4 #</b>   | D0120           | Periodic Examination  | Rotary Head Replacement  | Denture Cup  |
|              | D1110           | Prophylaxis or Full Mouth Debridement if needed                             | Regular Toothbrush   | Denture Brush  |
|              | D1206           | Fluoride Varnish  | Toothpaste   | Mouthwash  |
|              | D9630           | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Mouthwash  | Denture Cleaning Tablets   |
|              | D1330           | Oral Hygiene Instructions   | Flossers   | Denture Adhesive   |
|              | D5899           | Denture Ultrasonic Cleaning   | Tongue Cleaner   | Tongue Cleaner   |
|              | D9630           | Oral Hygiene Home Care Products   | Toothettes<br>Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                            | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                                    |
| <b>5 #</b>   | D0120           | Periodic Examination  | Regular Toothbrush   | Denture Cup  |
|              | D1110           | Prophylaxis or Full Mouth Debridement if needed                             | Toothpaste   | Denture Brush  |
|              | D1110           | Prophylaxis   | Mouthwash  | Mouthwash  |
|              | D1206           | Fluoride Varnish  | Flossers   | Denture Cleaning Tablets   |
|              | D9630           | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Tongue Cleaner   | Denture Adhesive   |
|              | D1330           | Oral Hygiene Instructions   | Toothettes   | Tongue Cleaner   |
|              | D5899           | Denture Ultrasonic Cleaning   | Hand Wipes   | Hand Wipes   |
|              | D9630           | Oral Hygiene Home Care Products   | Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints  | Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints  |
| <b>6 #</b>   | D0120           | Periodic Examination  | Regular Toothbrush   | Denture Cup  |
|              | D1110           | Prophylaxis or Full Mouth Debridement if needed                             | Toothpaste   | Denture Brush  |
|              | D1206           | Fluoride Varnish  | Mouthwash  | Mouthwash  |
|              | D9630           | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Flossers   | Denture Cleaning Tablets   |
|              | D1330           | Oral Hygiene Instructions   | Tongue Cleaner   | Denture Adhesive   |
|              | D5899           | Denture Ultrasonic Cleaning   | Toothettes   | Tongue Cleaner   |
|              | D9630           | Oral Hygiene Home Care Products   | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints  | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                                    |

## PrevMED 12 Month Oral Health Maintenance<sup>®</sup> Program

| Month | CDT Code                        | Services and Disposables  | Natural Teeth Oral Hygiene Products / Xerostomia Products based on Patient functionality and tolerability | Denture Oral Hygiene Products / Xerostomia Products based on Patient functionality and tolerability |
|-------|---------------------------------|---|---|---|
| 7 #   | D0120                           | Periodic Examination  | Rotary Toothbrush   | Denture Cup   |
|       | D1110                           | Prophylaxis or Full Mouth Debridement if needed                             | Regular Toothbrush  | Denture Brush   |
|       | D1206                           | Fluoride Varnish  | Toothpaste  | Mouthwash   |
|       | D9630                           | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Mouthwash   | Denture Cleaning Tablets  |
|       | D1330                           | Oral Hygiene Instructions   | Flossers  | Denture Adhesive  |
|       | D5899                           | Denture Ultrasonic Cleaning   | Tongue Cleaner  | Tongue Cleaner  |
|       | D9630                           | Oral Hygiene Home Care Products   | Toothettes<br>Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                     | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                             |
| 8 #   | D0120                           | Periodic Examination  | Regular Toothbrush  | Denture Cup   |
|       | D1110                           | Prophylaxis or Full Mouth Debridement if needed                             | Toothpaste  | Denture Brush   |
|       | D1110                           | Prophylaxis   | Mouthwash   | Mouthwash   |
|       | D1206                           | Fluoride Varnish  | Flossers  | Denture Cleaning Tablets  |
|       | D9630                           | 10% Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products          | Tongue Cleaner  | Denture Adhesive  |
|       | D1330                           | Oral Hygiene Instructions   | Toothettes  | Tongue Cleaner  |
|       | D5899                           | Denture Ultrasonic Cleaning   | Hand Wipes  | Hand Wipes  |
| D9630 | Oral Hygiene Home Care Products | Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                   | Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints   |   |
| 9 #   | D0120                           | Periodic Examination  | Regular Toothbrush  | Denture Cup   |
|       | D1110                           | Prophylaxis or Full Mouth Debridement if needed                             | Toothpaste  | Denture Brush   |
|       | D1206                           | Fluoride Varnish  | Mouthwash   | Mouthwash   |
|       | D9630                           | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Flossers  | Denture Cleaning Tablets  |
|       | D1330                           | Oral Hygiene Instructions   | Tongue Cleaner  | Denture Adhesive  |
|       | D5899                           | Denture Ultrasonic Cleaning   | Toothettes  | Tongue Cleaner  |
|       | D9630                           | Oral Hygiene Home Care Products   | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                                   | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                             |

PrevMED  
12 Month Oral Health Maintenance<sup>®</sup> Program

| Month | CDT Code                        | Services and Disposables  | Natural Teeth Oral Hygiene Products / Xerostomia Products based on Patient functionality and tolerability | Denture Oral Hygiene Products / Xerostomia Products based on Patient functionality and tolerability |
|-------|---------------------------------|---|---|---|
| 10 #  | D0120                           | Periodic Examination  | Rotary Head Replacement   | Denture Cup   |
|       | D1110                           | Prophylaxis or Full Mouth Debridement if needed                             | Regular Toothbrush  | Denture Brush   |
|       | D1206                           | Fluoride Varnish  | Toothpaste  | Mouthwash   |
|       | D9630                           | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Mouthwash   | Denture Cleaning Tablets  |
|       | D1330                           | Oral Hygiene Instructions   | Flossers  | Denture Adhesive  |
|       | D5899                           | Denture Ultrasonic Cleaning   | Tongue Cleaner  | Tongue Cleaner  |
|       | D9630                           | Oral Hygiene Home Care Products   | Toothettes<br>Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                     | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                             |
| 11 #  | D0120                           | Periodic Examination  | Regular Toothbrush  | Denture Cup   |
|       | D1110                           | Prophylaxis or Full Mouth Debridement if needed                             | Toothpaste  | Denture Brush   |
|       | D1110                           | Prophylaxis   | Mouthwash   | Mouthwash   |
|       | D1206                           | Fluoride Varnish  | Flossers  | Denture Cleaning Tablets  |
|       | D9630                           | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Tongue Cleaner  | Denture Adhesive  |
|       | D1330                           | Oral Hygiene Instructions   | Toothettes  | Tongue Cleaner  |
|       | D5899                           | Denture Ultrasonic Cleaning   | Hand Wipes  | Hand Wipes  |
| D9630 | Oral Hygiene Home Care Products | Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                   | Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints   |   |
| 12 #  | D0120                           | Periodic Examination  | Regular Toothbrush  | Denture Cup   |
|       | D1110                           | Prophylaxis or Full Mouth Debridement if needed                             | Toothpaste  | Denture Brush   |
|       | D1206                           | Fluoride Varnish  | Mouthwash   | Mouthwash   |
|       | D9630                           | 10% Povidone Iodine, MI Paste, Chlorhexidine, Periodex, Xerostomia Products | Flossers  | Denture Cleaning Tablets  |
|       | D1330                           | Oral Hygiene Instructions   | Tongue Cleaner  | Denture Adhesive  |
|       | D5899                           | Denture Ultrasonic Cleaning   | Toothettes  | Tongue Cleaner  |
|       | D9630                           | Oral Hygiene Home Care Products   | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                                   | Hand Wipes<br>Xylitol Mouth Spray<br>Xylitol Lollipops<br>Xylitol Mints                             |

Month # - As Needed Minimal Noninvasive Non-Surgical Restorative Techniques to include D2999 Atraumatic Restorative Treatment per tooth surface as needed and D2940 Intermediate Restorative Sedative Filling Material per tooth surface as needed.

D9630 Oral Infection Control Products – These products are prescribed by the dentist for the dental hygienist to apply and distribute according to the individual needs of the resident. Examples of these products may include MI Paste (Recaldent), Fluoride Varnish, Antimicrobial rinse (Peridex) and various Xylitol Products.

D9630 Oral Hygiene Home Care Products – For daily use the resident will receive one battery operated toothbrush every six months. In addition a manual toothbrush, toothpaste, mouthwash, Xylitol mints and denture products where applicable, are replenished monthly as needed.

## Atraumatic Restorative Treatment (ART)

ART has been endorsed by the World Health Organization as well as the International Association for Dental Research<sup>ii</sup>. The purpose of ART is to treat and prevent cavities under circumstances that merit an alternative to traditional cavity treatment.

Glass ionomer is the most widely used material in ART because of its high success rates. One study found the success to be as high as 97 percent after one year and as high as 86 percent after three to six years<sup>xxxvi</sup>. Other benefits include relatively low cost, a less invasive process, as well as projected longevity<sup>xxxvii</sup>.

The ART technique has been suggested as a viable restorative option for the elderly population. A study of institutionalized elders compared the after-effects of the traditional root restoration method of caries versus that of ART with glass ionomer. The success rates of both procedures after one year were nearly identical, with the former being about 91 percent and the later, 87 percent<sup>xxxviii</sup>.

Its anti-microbial effects also add to its benefit. Most adhesive materials do not form a perfect seal. This can lead to leakage of oral fluids and subsequent bacterial growth<sup>ivxxxix</sup>. Glass ionomers, however, have shown to prevent bacterial growth, especially when used in tandem with chlorhexidine.

One study by Davidovich et al. studied the effect of glass ionomers on bacteria. They introduced bacteria to three different glass ionomer samples and saw no bacterial growth on either one of them<sup>xxxix</sup>. The introduced

bacteria included *S. mutans* and *A. viscosus*, both associated with the development of cavities<sup>xxxix</sup>.

The anti-bacterial effect of glass ionomer can mean “fewer wall lesions, less demineralization, and greater inhibition of caries formation compared to fluoride-containing composites or non-fluoridated restorative materials<sup>xl</sup>.”

Glass ionomers initially release a large amount of fluoride. This fluoride release wanes after an extended period of time. This fluoride can be “recharged” in order to maintain optimal effectiveness. If fluoride is indeed recharged, it may have a positive effect on longevity and ultimate success in treated high-caries-risk patients<sup>xl</sup>.

## ATRAUMATIC RESTORATIVE TREATMENT

<sup>1</sup> van't Hof MA, Frencken JE, van Palenstein Helderma WH, Holmgren CJ. The atraumatic restorative treatment (ART) approach for managing dental caries: a meta-analysis. *Int Dent J* 2006;56(6): 345–51.

<http://www.ncbi.nlm.nih.gov/pubmed/17243467?dopt=Abstract>

<sup>1</sup> Davidovich E, Weiss E, Fuks AE, Beyth N. Surface antibacterial properties of glass ionomer cements used in atraumatic restorative treatment. *JADA* <http://jada.ada.org/content/138/10/1347.short>

<sup>1</sup> Lo EC, Luo Y, Tan HP, Dyson JE, Corbet EF. ART and conventional root restorations in elders after 12 months. *J Dent Res* 2006 Oct;85(10):929-32.3

<http://www.ncbi.nlm.nih.gov/pubmed/16998134>

<sup>1</sup> Loesche WJ. Role of *Streptococcus mutans* in human dental decay. *Microbiol Rev* 1986;50(4):353–80.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC373078/?page=1>

<sup>1</sup> Larson T. The therapeutic use of glass ionomer. *Northwest Dentistry Journal*.

[http://www.mndental.org/features/2008/12/30/80/the\\_therapeutic\\_use\\_of\\_glass\\_ionomer](http://www.mndental.org/features/2008/12/30/80/the_therapeutic_use_of_glass_ionomer)

### **Sedative Fillings: Intermediate Restorative Material (IRM)**

Sedative fillings are placed on a tooth to reduce pain from irritated or inflamed pulp — the blood vessels and nerves in the center of a tooth. A sedative filling calms the pulp and reduces the chance that saliva or bacteria will leak into the tooth and irritate the pulp in the future.

Sedative fillings are placed directly into the tooth often without any drilling. One of the most common types of sedative filling is zinc oxide and eugenol. This contains oil of cloves.

Intermediate restorative material (IRM) is a zinc oxide and eugenol cement that has been reinforced with the addition of an acrylic resin. IRM has been extremely effective in Skilled nursing Facilities as a mid- stage atraumatic restorative material.

A sedative filling is considered an intermediate measure, and often is used in elderly or disabled patients who can't tolerate sitting in a dentist's chair long enough to receive a regular filling. A sedative filling also may be used for a patient who has a traumatized tooth and needs immediate relief.

Strength properties of IRM include low solubility, abrasion resistance and excellent sealing properties. This will often slow or stop the progression of decay and help the patient feel better. It also may allow the tooth time to recover and lay down secondary dentin, sometimes eliminating the need for pulpal treatment like a root canal.

### **Sedative Fillings (Intermediate Restorative Material)**

Friedman S, Shani J, Stabholz A, Kaplawi J. Comparative sealing ability of temporary filling

materials evaluated by leakage of radiosodium. *Int Endod J* 1986;19(4):187–93.[Medline]  
Cox CF, Keall CL, Keall HJ, Ostro E, Bergenholtz G. Biocompatibility of surface-sealed dental materials against exposed pulps. *J Prosthet Dent* 1987;57(1):1–8.[Medline]  
Blaney TD, Peters DD, Setterstrom J, Bernier WE. Marginal sealing quality of IRM and Cavit as assessed by microbiol penetration. *J Endod* 1981;7:453–7.[Medline]<sup>1</sup>

### **Fluoride Varnish**

Fluoride varnish is a highly concentrated form of fluoride which is applied to the tooth's surface, by a dentist, dental hygienist or other health care professional, as a type of topical fluoride therapy. It is not a permanent varnish but due to its adherent nature it is able to stay in contact with the tooth surface for several hours. It may be applied to the enamel, dentin or cementum of the tooth and can be used to help prevent decay, remineralize the tooth surface and to treat dentin hypersensitivity. Numerous clinical trials conducted in the past 25 years have examined the efficacy of fluoride varnishes in preventing dental caries. Tewari and associates reported that after 2.5 years, the fluoride varnish resulted in a higher percentage of caries reduction than did the 2 percent sodium fluoride solution and the 1.23 percent acidulated phosphate fluoride gel.

The concentration of fluoride in varnishes is much higher than that of acidulated phosphate fluoride (APF) gels or other topical fluorides. However, due to the sticky form of the varnish and the small amount used per application, risk of ingestion and toxicity is very low. Less than 0.5 ml of varnish is usually required to coat the teeth in most patients.

Hawkins R, Noble J, Locker D et al. A Comparison of the Costs and Patient Acceptability of Professionally

Applied Topical Fluoride Foam and Varnish Journal of Public Health Dentistry (2004); 64(2):106-110

Professionally Applied Topical Fluoride: Evidence Based Clinical Recommendations. American Dental Association Council on Scientific Affairs; JADA August 2006 Vol 137: 1151-1159 <http://jada.ada.org>  
Strohmenger, L and Brambilla, E.

The Use of Fluoride Varnishes in the Prevention of Dental Caries: A Short Review, Oral Diseases March 2001

Tewari A, Chawla HS, Utreja A. Comparative evaluation of the role of NaF, APF & Duraphat topical fluoride applications in the prevention of dental caries—a 2.1/2 years study. J Indian Soc Pedod Prev Dent 1990;8:28–35

ADA. Report of the Council on Scientific Affairs. Evidence-based Clinical Recommendations: Professionally Applied Topical Fluoride, May 2006. ([http://www.ada.org/prof/resources/pubs/jada/reports/report\\_fluoride.pdf](http://www.ada.org/prof/resources/pubs/jada/reports/report_fluoride.pdf))

## MI Paste

MI Paste is the only product for professional use containing the active ingredient RECALDENT™ (CPP-ACP), a special milk-derived complex of casein phosphopeptide (CPP) and amorphous calcium phosphate (ACP) that binds calcium and phosphate to tooth surfaces, plaque and surrounding soft tissue. Calcium phosphate is highly insoluble, however the peptides are able to maintain the calcium and phosphate in an ionic form, preventing the formation of insoluble calcium phosphate and therefore enabling calcium and phosphate ions to enter the tooth matrix and remineralize areas of hypomineralized enamel. Furthermore, the peptides bind to the surface of the tooth, and to the bacteria surrounding the tooth, presenting a reservoir of ionic calcium and phosphate at the tooth surface.

MI Paste is a water-based, sugar-free creme that is applied directly to the tooth surface or oral cavity. MI Paste with RECALDENT™ (CPP-ACP) restores the oral mineral imbalances that cause demineralization by replacing minerals while improving saliva flow and fluoride uptake

as well as soothing sensitive surfaces - making it an ideal treatment for relieving dry mouth caused by certain medications, buffering acids produced by bacteria and plaque and providing a topical coating for patients suffering from erosion, caries and conditions arising from xerostomia.

Reynolds and colleagues reported that CPP-ACP binds readily to the surface of the tooth, as well as to the bacteria in the plaque surrounding the tooth. In this way, CPP-ACP deposits a high concentration of ACP in close proximity to the tooth surface. The authors proposed that under acidic conditions, this localized CPP-ACP buffers the free calcium and phosphate ions, substantially increasing the level of calcium phosphate in plaque and, therefore, maintaining a state of super-saturation that inhibits enamel demineralization and enhances remineralization.

Reynolds EC, Cain CJ, Webber FL, et al.

Anticariogenicity of calcium phosphate complexes of tryptic casein phosphopeptides in the rat. J Dent Res 1995;74(6):1272–1279

Aimutis WR. Bioactive properties of milk proteins with particular focus on anticariogenesis. J Nutr 2004;134(4):989S–995S

Guggenheim B, Schmid R, Aeschlimann JM, Berrocal R, Neeser JR. Powdered milk micellar casein prevents oral colonization by Streptococcus sobrinus and dental caries in rats: a basis for the caries-protective effect of dairy products. Caries Res 1999;33

## MAINTENANCE OF ORAL HEALTH

*“Simple oral decontamination using topical antimicrobial agents such as chlorhexidine gluconate both with and without mechanical plaque control appears to be effective in substantially reducing the rate of pneumonia in vulnerable population”*

JADA, Vol. 138 <http://jada.ada.org> September 2007

## 10% PVP Iodine

Povidone Iodine, or PVP Iodine, is a wide-ranging antiseptic that may be used in the treatment of periodontitis. It may be considered one of the most potent antimicrobial substances available. It is also known to be effective against viruses. This is a notable characteristic, because viruses connected to the development of periodontal disease can be resistant to alternate antimicrobial substances like chlorhexidine<sup>xli</sup>.

Another important aspect of PVP Iodine worth noting is that bacteria are not known to grow resistant. In addition, its effectiveness is not lessened by any other type of established bacterial resistance. It is also available at relatively low costs.

One study by Kotsilkov et al. found that 10% PVP Iodine was extremely effective in treating periodontal disease. In the areas treated, there was increased attachment, reduced probing depth, and less inflammation when compared with those not treated<sup>l</sup>.

The effects of PVP Iodine may be even more astounding when used with a root scaling plan and regular cleaning of the oral cavity. One double-blind study looked at this very relationship, and found that a regimen that included scaling and root planning along with subgingival irrigation of PVP Iodine lead to a 95% or more decrease in pathogen counts within 44% of pockets 6 mm or greater. This was compared to pockets that were treated with only one method. Those pockets saw the 95% result in only 6-13% of subjects<sup>xliii</sup>.

## 10% PVP IODINE

Kotsilkov K, Emilov D, Popova C. Subgingival irrigations with povidone-iodine as adjunctive treatment of chronic periodontitis. Journal of IMAB 2009.

[www.journal-imab-bg.org/statii-09/vol09\\_2\\_84-88str.pdf](http://www.journal-imab-bg.org/statii-09/vol09_2_84-88str.pdf)

Hoang T, Jorgensen MG, Keim RG, Pattison AM, Slots J. Povidone-iodine as a periodontal pocket disinfectant. J Periodontal Res. 2003 Jun;38(3):311-7. <http://www.ncbi.nlm.nih.gov/pubmed/12753370>

## Doxycycline

Doxycycline is an antibiotic used to treat a variety of infections. When used in tandem with other oral health care procedures, it can be used as an effective tool to fight periodontal disease, and its harmful side effects.

It can be ingested by use of a capsule, or implanted by a dentist directly into the infected gum pocket. Many studies have shown the positive outlook for patients who incorporate doxycycline into their periodontal health regimen.

Subgingival implementations were paired with debridement in one study analyzing the effect on thirty subjects with what was deemed "severe" periodontitis. Every week for four weeks subjects endured the removal of plaque and additional oral health care directions like brushing teeth.

Those who had 6 months of subantimicrobial doxycycline treatment and pockets equal to or greater than 7 mm saw a reduction of 3 mm after 9 months. This compared with only 1.42 mm for the control group. In those with pockets of 7 mm or more, 40% saw a reduction of 4 mm and 55% saw a reduction of 3 mm .

Another study analyzed the specific effect of this treatment on the elderly population. Seniors 65 and older who had detachment 5 mm and over and probing depth of 4-9 mm were involved. Every subject was treated with scaling and root planning and some received subantimicrobial dose of doxycycline (SDD) twice daily. When compared with the placebo, the group treated with SDD saw statistically significant reductions in probing depth by the 9th month.

Doxycycline can have a very positive effect on oral health when used in conjunction with other health care practices such as debridement and scaling and root planning.

#### **DOXYCYCLINE**

Novak MJ, Johns LP, Miller RC, Bradshaw MH. Adjunctive benefits of subantimicrobial dose doxycycline in the management of severe, generalized, chronic periodontitis. *J Periodontol.* 2002 Jul;73(7):762-9. PubMed PMID: 12146536. <http://www.ncbi.nlm.nih.gov/pubmed/12146536>

Mohammad AR, Preshaw PM, Bradshaw MH, Hefti AF, Powala CV, Romanowicz M. Adjunctive subantimicrobial dose doxycycline in the management of institutionalised geriatric patients with chronic periodontitis. *Gerodontology.* 2005 Mar;22(1):37-43. PubMed PMID: 15747897.

#### **Xylitol**

Xylitol is a naturally occurring sweetener that may be used as a sugar substitute. Studies have shown that this substance can be used to limit or prevent cavities. It is considered to be as sweet as traditional table sugar, and has several medical benefits. For one, it does not require insulin to metabolize, and therefore, can be a mainstay in a diabetic diet<sup>xlvi</sup>.

The second derived health benefit affects the oral cavity. Products that contain Xylitol, such as chewing gum or candy substitutes, have been shown to reduce caries. This was true among children and adult populations<sup>xlvi</sup>. This may be due to the increased salivary flow and the non-fermentable qualities it exhibits in the presence of bacteria.

There is evidence that Xylitol can decrease bacterial levels while simultaneously decreasing their adhesivity<sup>xlvii</sup>. Three studies that spanned 6 months found that Xylitol was found to decrease bacterial levels in plaque.

One study by Milgrom et. al saw a relationship between increased dosages of Xylitol and

decreased levels of bacteria when studying the effect of Xylitol in the chewing gum form while treating Mutans streptococci. They deduced that the optimal dosage of Xylitol ranged from 6.88 grams to 10.32 grams due to a “plateau effect” that was eventually observed<sup>l</sup>.

Due to its natural health benefits and absence of harmful effects, Xylitol can be a viable option for preventing tooth decay. It can also be used often and regularly.

#### **XYLITOL**

Peldyak J, Mäkinen KK. Xylitol for caries prevention. *J Dent Hyg.* 2002 Fall;76(4):276-85. Review. PubMed PMID: 12592919.

<http://www.ncbi.nlm.nih.gov/pubmed/12592919>  
Soderling EM. Xylitol, mutans streptococci, and dental plaque. *Adv Dent Res.* 2009;21(1):74-8. <http://adr.sagepub.com/content/21/1/74.full>

Mäkinen KK, Isotupa KP, Mäkinen P-L, Söderling E, Song KB, Nam SH, et al. (2005). Six-month polyol chewing-gum programme in kindergarten-age children: a feasibility study focusing on mutans streptococci and dental plaque. *Int Dent J* 55:81–88. <http://www.ncbi.nlm.nih.gov/pubmed/15880962?dopt=Abstract>

Merikallio MC, Söderling E (1995). Xylitol as a plaque-control agent in military conditions. *Mil Med* 160:256–258. <http://www.ncbi.nlm.nih.gov/pubmed/7659216?dopt=Abstract>

Milgrom P, Ly KA, Roberts MC, Rothen M, Mueller G, Yamaguchi DK (2006). Mutans streptococci dose response to xylitol chewing gum. *J Dent Res* 85:177–181. [http://jdr.sagepub.com/content/85/2/177.abstract?ikey=3bad91c3720df2d37dcb103c75325d08001c1e70&keytype2=tf\\_ipsecsha](http://jdr.sagepub.com/content/85/2/177.abstract?ikey=3bad91c3720df2d37dcb103c75325d08001c1e70&keytype2=tf_ipsecsha)

#### **Chlorhexidine**

Chlorhexidine is a dental rinse used to treat gingivitis and periodontitis. It can reduce inflammation and bacterial levels in the oral cavity. When used, the rinse can also fight

against plaque build-up and further deter its formation.

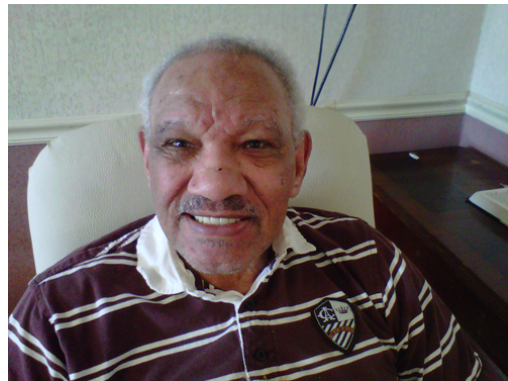
It can also be applied topically as a chlorhexidine gluconate. One study found that when applied in this form, it fully prevented any plaque formation. This study also observed the effects of a 0.2 percent solution of chlorhexidine. They found that when used twice daily, it was an effective means of preventing plaque formation as well.

Another study examined the effects of chlorhexidine in the geriatric population. They analyzed the optimal dose and frequency that should be used within this demographic. When chlorhexidine was used in the absence of any other oral health care practices, there was a positive effect on oral conditions. There was also a subsequent decrease in risk for periodontal disease and tooth decay, an important effect to note due to the prevalence of these conditions among the elderly.

#### **CHLORHEXIDINE**

Löe, H. and Rindom Schiøtt, C. (1970), The effect of mouth rinses and topical application of chlorhexidine on the development of dental plaque and gingivitis in man. *Journal of Periodontal Research*, 5: 79–83. doi: 10.1111/j.1600-0765.1970.tb00696. <http://onlinelibrary.wiley.com/doi/10.1111/j.1600-0765.1970.tb00696.x/abstract>

Persson R, Truelove E, LeResche L, Robinovitch, MR (1991). Therapeutic effects of daily or weekly chlorhexidine rinsing on oral health of a geriatric population. *Oral Surgery, Oral Medicine, Oral Pathology* 72:2 184-191. <http://www.sciencedirect.com/science/article/pii/0030422091901615>





*Serving Every Patient, Every Month*

## **Corporate Offices**

210 Pier One Road  
Stevensville, MD 21666

[www.PrevMED.org](http://www.PrevMED.org)

877.604.2444