

Treating the Aging Baby Boomer: Looking through the Crystal Ball

This course is no longer offered for Continuing Education credit.



Course Author(s): Salme E. Lavigne, RDH, PhD

CE Credits: N/A

Intended Audience: Dentists, Dental Hygienists, Dental Students, Dental Hygiene Students

Date Course Online: 03/02/2015

Last Revision Date: 09/01/2018

Course Expiration Date: 08/31/2021

Cost: Free

Method: Self-instructional

AGD Subject Code(s): 70

Disclaimer: Participants must always be aware of the hazards of using limited knowledge in integrating new techniques or procedures into their practice. Only sound evidence-based dentistry should be used in patient therapy.

Conflict of Interest Disclosure Statement

- Dr. Lavigne is a member of the dentalcare.com Advisory Board.

Introduction – Treating the Aging Baby Boomer

Treating the Aging Baby Boomer: Looking through the Crystal Ball explores the oral and general health issues facing one of the fastest growing population groups, the aging Baby Boomers. This course will focus on what their future oral health needs will be, how their oral health could impact their overall health, issues surrounding those confined to institutional care, and how to make decisions about which oral treatment options would be the most beneficial for all levels of Baby Boomer needs.

Course Contents

- Overview
- Learning Objectives
- Glossary
- Changing Demographics and Global Population Statistics
- Changing Health of Older Adults Worldwide
- Oral Health Challenges Facing Healthy Boomers
- Overall Health Issues and the Oral-Systemic Link
- Risks Associated with Oral Health Issues for Older Adults
- Issues with Access to Oral Care
- Oral Health-related Issues with Institutionalized Older Adults
- Evidence-based Treatment Recommendations for Oral & Systemic Health
- Making Treatment Recommendations for Aging Boomers: What Does the Future Hold?
- Conclusion
- Course Test
- References
- About the Author

Overview

This topic explores the oral and general health issues facing one of the fastest growing population groups, the aging Baby Boomers. This course will focus on what their future oral health needs will be, how their oral health could impact their overall health, issues surrounding those confined to institutional care, and how to make decisions about which oral treatment options would be the most beneficial for all levels of Baby Boomer needs.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Define what is meant by the Baby Boomer Generation.
- Describe the changing demographics of this aging population cohort worldwide.
- Discuss the changing oral health needs of this new group of older adults.
- Discuss how the overall health of the Baby Boomer can impact their oral health needs and how oral health is related to systemic health.
- Identify risks that oral health issues may impose on the overall health of the Baby Boomer and on the healthcare system.

- Discuss access to care issues for this growing group of older adults.
- Discuss issues facing institutionalized older adults.
- Identify oral health interventions that have had positive effects on both oral and systemic health based on current evidence.
- Develop treatment recommendations for the aging Baby Boomer.

Glossary

Baby Boomers - A baby boomer is a person who was born during the demographic Post – World War II baby boom between the years 1946 and 1964.³¹

c-reactive protein - C-reactive protein is a non-specific biomarker of inflammation that is produced in the liver. During any type of inflammation, c-reactive protein levels will be elevated.¹⁴

carotid-intima-media thickness - Refers to the thickness of the 2 innermost layers of the wall of the carotid artery in the neck. The smaller the lumen size, the thicker the walls, which suggest the presence of subclinical atherosclerosis and is associated with several cardiovascular risk factors. It is typically measured by ultrasound imaging.³²

endothelial dysfunction - Endothelial dysfunction is a condition in which the endothelium (inner lining) of blood vessels does not function normally. Endothelial dysfunction is thought to play a major role in the development of atherosclerosis and can be caused by conditions such as diabetes, metabolic syndrome, hypertension, smoking and physical inactivity.³³

NSPT - Refers to Non-surgical Periodontal Therapy which includes debridement of hard and soft deposits from the teeth (i.e., scaling and root planing).

oscillating-rotating electric toothbrush technology - The oscillating-rotating electric toothbrush technology pioneered by Oral-B is supported by a plethora of clinical studies. Research demonstrates the safety and efficacy of oscillating-rotating electric toothbrushes for plaque removal, extrinsic stain removal, and gingivitis reduction.³⁴

polypharmacy - Refers to the prescription of multiple drugs (usually 4 or more), a common occurrence with older adults and in particular, those confined to institutional settings. Often these drugs are prescribed by numerous physicians and may be uncoordinated placing the patient at risk for side-effects.

sialagogue agent - A medication that increases the flow of saliva.³⁵

xerostomia - Refers to dry mouth, which can have numerous causes such as aging, disease, medications etc.

Changing Demographics and Global Population Statistics

Landon Jones (author), coined the term “Baby Boomer” in his book “Great Expectations: America and the Baby Boom Generation.”¹ In both the US and Canada, as the second World War came to an end and soldiers returned to their countries, 20 million babies were born during the “Boom” between 1946 and 1964. This generation has often been associated with a rejection or redefinition of traditional cultural and social values and has been noted for playing a role in the expansion of individual freedoms such as the Civil rights movement; the feminist movement in the early 1970’s; the introduction of Gay rights and the right to privacy. This group of individuals is healthier and more affluent than their predecessors.¹

According to the World Health Organization (WHO), they claim a demographic revolution is currently occurring with the aging of this cohort of individuals.² The WHO reports that the proportion of people over 60 years of age worldwide will double by 2025. By 2050, 80% of older people will live in low- and middle-income countries. Countries such as *Chile*, *China* and the *Islamic Republic of Iran* will have a greater proportion of older people than the United States of America. The number of older people in Africa will grow from 54 million to 213 million.

In the US, the growth in the number and proportion of older adults is unprecedented in its history. Two factors, longer life spans and aging Baby Boomers, will combine to double

the population of Americans aged 65 years or older during the next 25 years. By 2050, older adults will account for roughly 25-29% of the US population.² Similarly, in Canada, according to the Canadian Longitudinal Study on Aging, older persons continue to make up a larger share of the population (14% in 2006)³ and are projected to also rise to 30% by 2050.²

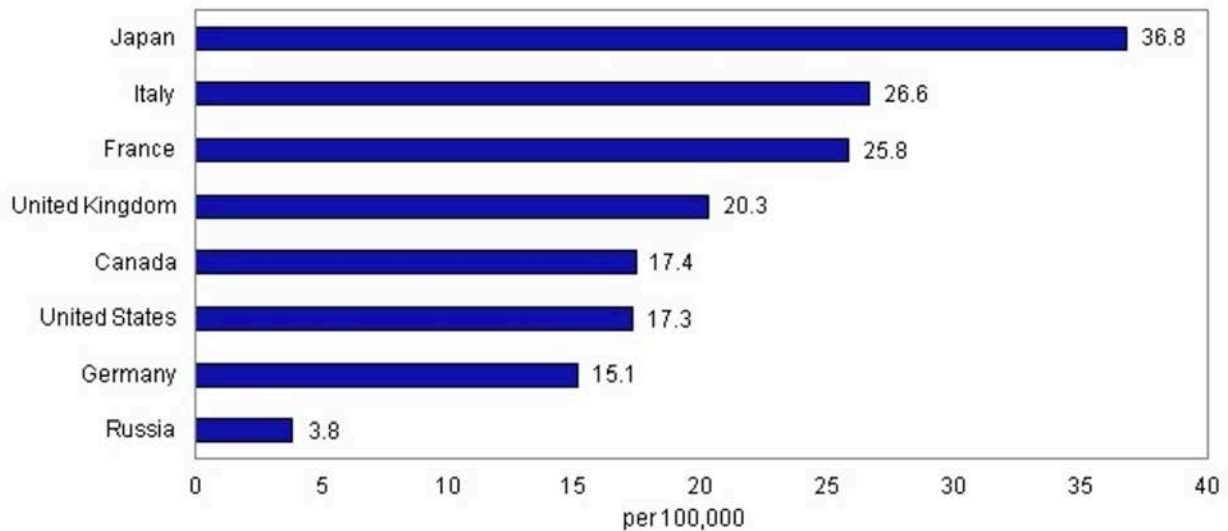
Most seniors currently are in the youngest age range (68-77), while those truly classified as Baby Boomers turned 69 in 2015. However, the proportion of the most elderly (85+) is growing rapidly. Most seniors currently are women, especially in the older age group (75+), making up 60%. Women will continue to outnumber men, but the gap in life expectancy is projected to narrow between men and women. The increase in life expectancy has been attributed to advances in medical care, improved public health, higher educational attainment and per capita income. Recent US life expectancy predictions for females were 81.0 years (men: 76.2), while Canadian women are expected to live 86.1 years on average (men: 82.9 years).^{4,5}

What is of significance is the number of centenarians has steadily increased, globally as shown in Table 1. However, it is noteworthy that both the United States and Canada are relatively equal at 17%, while other countries have far surpassed North American numbers with Japan at close to 37%.

Changing Health of Older Adults Worldwide

This major demographic shift in population will undoubtedly place both social and health care demands on governments that will have major financial implications. Although the life expectancy has risen dramatically, of concern is that the main health burdens for older people have shifted now from communicable diseases to primarily non-communicable diseases. These non-communicable diseases include chronic diseases such as heart disease, stroke, lung disease, cancer and diabetes. Even in the poorest countries the biggest killers are heart disease, stroke and chronic lung disease. As well for the older adult group, the greatest causes of disability are visual impairment, dementia, hearing loss and osteoarthritis.²

Table 1. Rate of Centenarians (per 100,000 persons), G8 Countries, 2011.



Sources: Statistics Canada, Census of Population, 2011; U.S. Census Bureau, 2010; National Institute of Statistics (Italy), 2010; National Institute of Statistics and Economic Studies (France), 2010; United Kingdom Office for National Statistics, 2010; Statistics Bureau of Japan, 2010; and Human Mortality Database for Germany, 2010, and for Russia, 2010.

In a comparison of the prevalence of chronic disease and disability among men and women aged 50-74 in the US, England and Europe, it is surprising to note that the US has the highest prevalence in both the chronic diseases listed as well as disability (Table 2).⁶

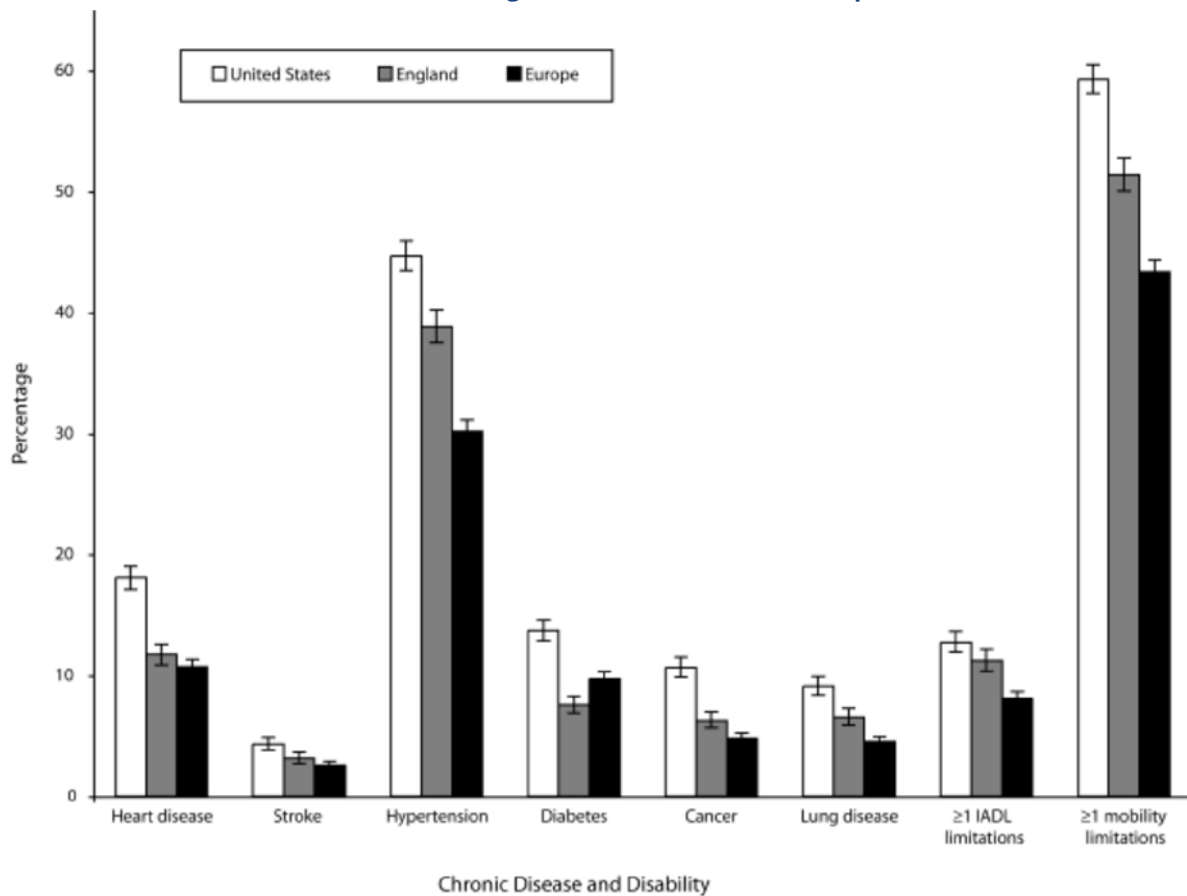
Oral Health Challenges Facing Healthy Boomers

With the Baby Boomer population being healthier, wealthier and happier than previous aging populations, they tend to be more active, are better educated, eat better and are keeping their natural teeth longer.¹ In fact, the edentulism rates have decreased significantly over the past 20 years and according to data from the National Health and Nutrition Examination Survey, 2011-2012, only 19% of those aged 65+ have no natural teeth.⁷ Not only do almost 80% of this population cohort have their own natural teeth, they are also living on average, 34 years longer than their grandparents. Society seems to have coined the 60's as the new 40's. With changes in the way we view the world, i.e., through television and the social media, role models such as Jane Fonda (1937) and Goldie Hawn (1945) seem to inspire the baby boomers to seek that eternal "Fountain of Youth."

Baby Boomers have, for the most part, received dental care throughout most of their lives if they have been gainfully employed. Many employers offer dental insurance as one of the benefits of employment; however upon retirement, these benefits are typically lost.⁸ Since the majority of boomers have their own natural teeth, it is likely they have also had numerous dental procedures such as crowns, bridges and possibly implants and are accustomed to having regular periodontal maintenance appointments. At a time when it is crucial to continue to maintain these restorations as well as their periodontal health, dental and dental hygiene visits often decline due to reduction in income as well as loss of dental insurance.

The middle-class more educated and more affluent boomers will most likely continue to visit their private dental practitioners, however those who are less educated and who no longer have dental insurance will more than likely no longer seek dental care.⁸ In the US, dental insurance coverage for seniors has been reported to range from 14.5% (those 65+) to 28% (65-74) and 16.5% (those 75+).⁸ Since retirement also results in a significant loss of income, priorities often change thus

Table 2. Prevalence of Chronic Disease and Disability among Men and Women Aged 50 to 74 years in the United States, England and Europe: HRS, United States, 2004; ELSA, England, 2004; and SHARE, Europe, 2004.



Notes: HRS = Health and Retirement Survey; ELSA = English Longitudinal Study of Ageing; SHARE = Survey of Health, Ageing and Retirement in Europe; IADL = instrumental activities of daily living. Model adjusted for age and gender; lines indicate 95% confidence intervals.

accounting for seniors having the lowest dental utilization rates. According to the US News and World Report, the 2014 median Social Security benefit was \$18,113 for men and only \$14,234 for women in the US. In Canada, the 2015 median income for senior women was about one-third less than men (\$21,900, compared to \$32,300 for men). The largest discrepancy in the US was that only 30% of all retirees had additional income from other sources such as employment pension plans and 401K's.

In addition to reduced dental visits, the effects of aging have an impact on overall health such as: reduced ability to fight infections, loss of manual dexterity, possible loss of appetite, and even possible malnutrition. It has been well-documented that as one ages, medication

requirements increase which could have significant side-effects such as xerostomia and drug-induced gingival enlargements.^{4,9} These changes can significantly impact the oral health of the individual. Lack of dental maintenance may result in both breakdown of restorations as well as periodontal disease. The American Academy of Periodontology reports older adults have a higher prevalence of periodontal disease, and the most recent National Health and Nutrition Examination Survey (NHANES) study found 70.1% of adults older than 65 had periodontal disease.^{9,10}

Additionally, the effects of xerostomia place the individual at higher risk for root caries, pain, loss of teeth and ultimately an inability to chew food properly. These consequences

may negatively impact the overall quality of life of the individual as well as placing them at higher risk for systemic disease such as cardiovascular disease, diabetes, respiratory disease and numerous other chronic conditions that are inflammatory in nature. The evidence for links between oral and systemic health has been mounting rapidly and will be discussed in further detail in the next section.

Overall Health Issues and the Oral-Systemic Link

Chronic diseases are on the rise worldwide.² Declines in health status and higher health care use are more likely to be driven by these chronic diseases than by age itself. More than a quarter of all Americans and two out of every three older Americans have been reported to have multiple chronic conditions. In addition, treatment for this older population accounts for 66% of the total US health care budget.¹¹

The most frequently reported chronic diseases in the US in order of occurrence are:

- Hypertension
- Heart disease
- Diabetes
- Cancer
- Stroke
- Chronic bronchitis
- Emphysema
- Asthma
- Kidney disease

Inflammation is closely linked with several of these chronic diseases. Diabetes for example has been shown through numerous studies to have a negative impact on oral health (i.e., if glucose levels are not under control, then periodontal disease manifests). As a result, the American Diabetes Association has listed periodontal disease as the sixth complication of diabetes.¹²

However, research has also shown a two-way relationship exists with diabetes and periodontal disease in that if oral inflammation is kept under control, glucose levels as well tend to normalize.¹³

With any chronic disease that is inflammatory in nature such as cardiovascular disease, kidney disease, some cancers and several

respiratory diseases, C-reactive protein (CRP) levels are elevated in the body. CRP is a non-specific marker of systemic inflammation produced in the liver. There is strong evidence from cross-sectional studies that plasma CRP in those with periodontitis, is also elevated compared with controls.^{14,15} Periodontal disease is a chronic inflammatory disease during the course of which, microorganisms present in the periodontal pockets, trigger the inflammatory process resulting in elevated levels of cytokines such as IL-6, and PGE2. These cytokines in turn, particularly IL-6, trigger the liver to produce CRP.¹⁵

This perpetuation of inflammatory biomarkers is now believed to play a contributory role in the pathogenesis of diseases such as: aspiration pneumonia, atherosclerosis, stroke, diabetes, rheumatoid arthritis, Alzheimer's disease, and end-stage renal disease. It is therefore imperative that oral inflammation be kept under control in order to reduce CRP levels even if to a lesser degree. Although no cause and effect relationship has been shown to date between these oral-systemic linkages, what has been shown is keeping one's periodontal disease under control can reduce the overall burden of systemic inflammation.

Numerous studies have been conducted to examine the effects of periodontal therapy in lowering CRP levels. A systematic review of these studies was conducted by Paraskevas et al., which revealed a modest effect of periodontal therapy in reducing CRP levels.¹⁴

The following table highlights the results of several studies testing various periodontal interventions on not only reductions in CRP values but also on improvements in cardiac endothelial function as well as improved lumen size of the carotid intima media.

Two more recent systematic reviews that included meta-analyses were conducted to assess the quality of the existing evidence regarding the impact of periodontal therapy on improving plasma levels of inflammation (CRP), carotid-intima media thickness and flow-mediated dilation.^{16,17} Their findings revealed that periodontal disease is associated with greater subclinical atherosclerosis as

Table 3. Periodontal Disease, Inflammation & Cardiac Function.

Study	Intervention	Outcome
Seinost G, et al. Periodontal treatment improves endothelial dysfunction in patients with severe periodontitis. Am Heart J. 2005	Scaling & root planing (S&RP) plus chlorhexidine rinses and systemic antibiotics CCT	Significant improvement in endothelial function (P=.0003) Significant decrease in CRP (p=.026)
Piconi S, et al. Treatment of periodontal disease results in improvements in endothelial dysfunction and reduction of the carotid intima-media thickness. FASEB J. 2009	Non-surgical periodontal therapy (NSPT)	Significant improvement in both CRP and carotid intima-media thickness Reductions in oral bacteria
Tonetti MS, et al. Treatment of periodontitis and endothelial function. N Engl J Med. 2007	Intensive periodontal therapy Control: community care	Endothelial function and CRP values improved in both groups
D'Aiuto F, et al. Short-term effects of intensive periodontal therapy on serum inflammatory markers and cholesterol. J Dent Res. 2005	1. S&RP 2. S&RP + Arestin (ITG) 3. Control (no tx) RCT	CRP was reduced in both treatment groups Statistically significant difference between treatment groups in LDL cholesterol for the intensive treatment group (ITG)
Higashi Y, et al. Periodontal infection is associated with endothelial dysfunction in healthy subject and hypertensive patients. Hypertension. 2008	2 Tx arms (those with and without hypertension) each of which received either no Tx or S&RP & Antibiotics RCT	Reduced CRP and improved endothelial function in the treatment groups for both those with and without hypertension
Elter JR, et al. The effects of periodontal therapy on vascular endothelial function: a pilot trial. Am Heart J. 2006	S&RP Surgery and extractions, as needed	Statistically significant reductions in endothelial dysfunction (p=.034) CRP reduced but not statistically significant

Source: S.E. Lavigne, 2011.

assessed by carotid-intima media thickness and flow-mediated dilation both of which were restored following periodontal treatment.^{16,17} Additionally, periodontal therapy showed improvements in plasma levels of inflammatory markers such as CRP, IL-6, Fibrinogen, Triglycerides, HDL-cholesterol, as well as HbA1C.¹⁷

Risks Associated with Oral Health Issues for Older Adults

It is interesting that although periodontal disease is considered to be treatable and preventable, it is one of the leading chronic diseases in America, Canada and the World. It shares numerous risk factors/risk indicators with other serious chronic diseases such as cardiovascular disease, stroke and diabetes (See Table 4). Prevention of any of these chronic diseases has always revolved around elimination of suspected risk factors/risk indicators. Although sufficient evidence does not yet exist to call periodontal disease a risk

factor for these serious chronic conditions, reductions in overall systemic inflammation (CRP) have been demonstrated by reducing oral inflammation as previously shown in Table 3. These chronic diseases place an enormous burden on the overall health care system, particularly with the older adult population. Health care costs for one person aged 65 or older is three to five times higher than the cost for someone younger.¹¹ If periodontal maintenance therapy were to be included for all seniors as part of a national prevention program, this could potentially have an enormous impact in reducing overall health care costs.

As one can see from this Table, the feature in common for all of these conditions is inflammation, highlighting the nature of these diseases and the importance of elimination of all sources of inflammation including the mouth.

Table 4. Shared Risk Factor/Indicator/Commonalities with Periodontal Disease, Cardiovascular Disease and Diabetes.

Risk Factor	Periodontal Disease	Cardiovascular Disease	Diabetes
Smoking	X	X	
Obesity (Metabolic Syndrome)	X	X	X
Stress	X	X	
Cholesterol		X	
Hypertension		X	X
Lack of Exercise		X	
Age	X	X	
Inflammation	X	X	X

Issues with Access to Oral Care

Access to dental care is considered to be one of the major determinants of oral health. Lack of insurance coverage and lower income may eventually prevent these aging baby boomers from accessing dental services. This issue is even more problematic for handicapped and institutionalized seniors. Those who are home-bound, may have difficulty getting to a dental office or community health facility and would definitely benefit from home dental services, which tend to be almost non-existent currently. Although legislative attempts have been made in many States in the US and in the majority of Canadian provinces to enable dental hygienists to practice in non-traditional settings, the issue of payment for services still exists. Until dental care for seniors ultimately falls under the public domain, this issue, will not disappear.

Oral Health-related Issues with Institutionalized Older Adults

A certain proportion of seniors will end up in a nursing home (NH) facility for a variety of reasons, however primarily, for their inability to no longer care for themselves. The greatest causes of disability have been listed as visual impairment, dementia, hearing loss and osteoarthritis. However, a large portion of these individuals will have dementia. Current worldwide rates of dementia for those aged 85+ are 25-30%. In Canada and the US, rates of dementia for NH residents are 57-65% and 70%, respectively.^{21,22}

Although seniors in general are living longer and baby boomers in particular appear to be healthier, the demand for nursing home admissions will increase in the future, but the age of entry will be older. The latest available US statistics demonstrating this increase in NH admissions reported a change from age 81.1 years in 1985 to 82.6 years in 1997.¹⁸ Predictions are that these figures will continue to rise as the boomers reach older age and most likely, these figures have already increased.

Oral care in a nursing home is problematic and has been reported by numerous authors to be actually “deplorable.”^{19,20} There seems to be not only a fear but a direct aversion to the

provision of oral care by most caregiver staff. Despite nursing home legislation mandating that residents receive oral care, there does not appear to be a system to monitor the implementation of that care. Numerous reports in both the US and Canadian literature, describe horrendous breaches in the delivery of oral care including lack of toothbrushes and other oral hygiene supplies; unsanitary storage of these supplies including partial and full dentures, as well as the lack of adherence to infection control procedures in the provision of oral care.¹⁹ This situation must change as now, more than ever before, these residents are entering with most of their own natural teeth along with very expensive dental work that will rapidly deteriorate if not cared for. Typically most nursing home facilities do not have dental clinics on-site nor dental professionals to care for them. In some States in the US and in several Canadian provinces, dental hygienists can contract with families to provide preventive and therapeutic dental hygiene services, however, for a fee. Once again, this does not solve the problem of those who cannot afford care.

One of the primary oral challenges with nursing home residents is xerostomia, a common occurrence with this population as a result of multiple medications or what has now been coined “polypharmacy.” Jablonski reports drug prescriptions to average eight medications per resident in US nursing homes.²² These drugs typically range from psychiatric drugs such as: anti-anxiety agents; antidepressants; antipsychotics (i.e., Benzodiazepams; Tricyclic antidepressants; Lithium); to antihypertensive drugs (i.e., Beta-blockers; calcium channel blockers, ACE inhibitors) and Urinary Incontinence Drugs (i.e., Darifenacin; fesoterodine and oxybutynin).

Those with xerostomia experience oral discomfort both in eating and during the provision of oral care and therefore may be less tolerable of oral interventions. Common oral symptoms of xerostomia include: mouth odor, commissure sores, speech difficulty, swallowing and chewing difficulty, burning tongue, sleep interruption due to thirst, taste disorders and prosthesis irritation. These

conditions can result in increased prevalence of periodontal disease, which has been reported to be higher in this population group. Additionally, increases in denture-related lesions such as denture stomatitis as well as higher prevalence of oral cancer, are common.

The most common result of prolonged xerostomia is the prevalence of root caries, which can cause significant pain, as well as the inability to enjoy eating many foods. These caries are difficult to treat and deteriorate quickly if not addressed in the early stages and often result in tooth loss. Broken down teeth and missing teeth affect one's inability to chew food properly, thus placing the person at risk for malnutrition.

The inability to chew food effectively has a negative impact on the overall health of the individual. The American Dietetic Association's recent position paper indicated that nutrition is the major determinant of successful aging.²³ Adequate nutrition is an effective disease management strategy that reduces chronic disease risk, slows disease progression and reduces disease symptoms. Thus the effects of poor oral health for this population sector can have long ranging negative effects for the institutionalized senior. Diminished psychological well-being, diminished overall life satisfaction, and social isolation due to broken teeth and breath malodor, can all have a negative impact on self-esteem as well as ultimate longevity.

The situation in nursing homes both nationally and internationally must be addressed, particularly as the Baby Boomers begin to enter these institutions. To date, a suitable solution has not been found.

Evidence-based Treatment Recommendations for Oral & Systemic Health

The gold standard for the treatment of periodontal disease and maintenance of good oral health has been demonstrated consistently in the literature as being regular scaling and root planing or non-surgical periodontal therapy (NSPT).²⁴ In studies that have also shown an impact on overall health

such as improved endothelial function and improvements in the lumen size of the carotid intima media, NSPT has in most instances been at least one of the interventions. Other interventions delivered concomitantly with scaling and root planing in these oral-systemic studies, have included the application of local drugs into the periodontal pockets such as Arestin™; the addition of chlorhexidine rinses; and inclusion of systemic antibiotics (See Table 3). However, daily plaque removal must always accompany these interventions or the benefits will be lost. One large Scottish epidemiological study demonstrated systemic benefits from just daily toothbrushing.²⁵

This daily toothbrushing can be done with either a traditional toothbrush or an electric toothbrush. Numerous general population studies and systematic reviews have shown the superior benefits of the use of an oscillating-rotating (O-R) electric toothbrush in daily plaque removal and improvements in oral inflammation when compared to a manual toothbrush.²⁶ Recommendations for the use of these electric brushes could be of major benefit to the Baby Boomer population as they age and potentially lose some of their manual dexterity. Additionally, some studies have shown positive benefits of the use of the O-R toothbrush in nursing home settings including caregiver preferences for the use of the electric brush.²⁷⁻³⁰ One of the reasons cited for their preference of the O-R power brush over the manual brush in these studies was the larger handle size and control they had as well as elimination of the fear of being bitten. Introduction of power toothbrushes into nursing home settings may help to improve the oral health of the residents by encouraging more consistent oral care by the caregiver staff.

For those individuals who have reduced salivary flow, contacting the patient's physician to discuss potential prescription changes to drugs that do not have a xerostomic effect would be a good starting point. If drug change is not a possibility, then prescription of a sialogogue agent such as *pilocarpine* to enhance salivary flow would be advisable. Recommendation of dry mouth products such as Biotene™, have been shown to be helpful in controlling some

of the symptoms of dry mouth. Additionally, for those with continued xerostomia who may be at risk for root caries application of a fluoride varnish and prescription of a fluoride mouth rinse have been shown to be successful preventive interventions.

Making Treatment Recommendations for Aging Boomers: What Does the Future Hold?

The most important part of making treatment recommendations is to conduct a thorough "assessment" of the patient. In order to capture both oral and systemic components of the assessment, a thorough understanding of the inter-relationship between oral and systemic inflammation as previously discussed is imperative. Assessment of the presence/absence of both oral and systemic inflammation must be done before proceeding further. The presence of oral inflammation is

assessed by conducting an oral periodontal examination using bleeding on probing as the gold standard for assessing periodontal inflammation. Systemic inflammation may be determined through a thorough medical history. A model for the assessment and treatment of inflammation follows. The boxes highlighted in red show the True Risk factors for periodontitis as well as the link between periodontitis and CRP. The boxes in deep blue represent Risk Indicators of periodontitis that have not yet been shown to be true risk factors for periodontitis but do have an impact on elevating levels of CRP. The resulting treatment algorithm provides a suggested pathway of intervention for the treatment and control of both oral and systemic inflammation.

Some future directions we can take to help Baby Boomers maintain their oral health are to increase our role in health

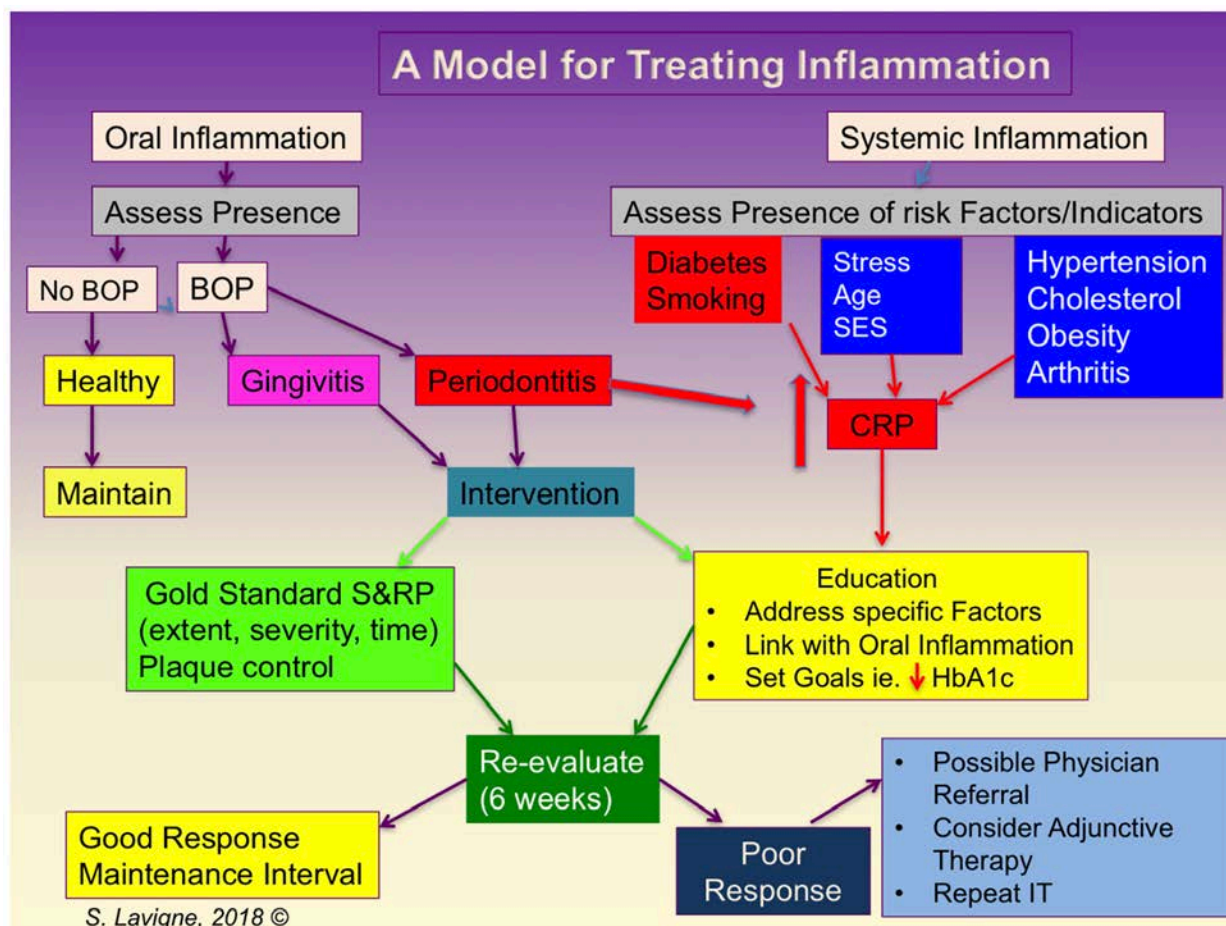


Figure 1.

advocacy, collaborate more with other health professionals and take on a more holistic approach to patient care. This future holistic approach could include the conduction of chair side screenings for inflammatory markers such as CRP and IL-6 as well as diabetes screenings for HbA1c levels. All oral health professional students are taught to take and monitor blood pressure, yet how many actually perform this function on a routine basis once they are out in practice? These screenings should become integral to patient care as we assume a more inter professional and holistic role.

Oral health professionals and in particular, dental hygienists, spend a large part of their educational preparation in learning to be health promoters, yet this very important role is often forgotten in practice. Dental hygienists can play a significant role in helping the emerging Baby Boomers to improve not only their oral health but their overall health by increasing their focus on health promotion activities such as:

- Diet Counseling
- Exercise Promotion

- Smoking Cessation Counseling
- Oral/Systemic Health Counseling
- Inter-professional Collaboration and Referrals

Conclusion

Over the next 20 years, the Baby Boomer population, as they age, will present many challenges and demands to the way we practice. This group of individuals will alter the demographics of the world population significantly by representing over one fifth of the people in the world. Additionally, they will be healthier, have their own teeth and will live longer than past populations. Although many will ultimately require further care in nursing homes and long-term care facilities, they will enter these facilities at an older age than current populations. A major shift in disease patterns has also begun to emerge with chronic diseases being more prevalent than infectious diseases. Linkages between oral and systemic health will continue to be further established, and the roles of oral health professionals must become more collaborative, interprofessional and holistic.

Course Test Preview

- 1. Baby Boomers are considered to be those individuals born between the years:**
 - A. 1945-1962
 - B. 1946-1964
 - C. 1948-1966
 - D. 1950-1970
- 2. US projections predict that by 2050, older adults will account for approximately:**
 - A. 10-15% of the population
 - B. 16-19% of the population
 - C. 20-24% of the population
 - D. 25-29% of the population
- 3. The number of centenarians in the G8 countries is highest in:**
 - A. the US
 - B. Canada
 - C. France
 - D. Japan
- 4. In a comparison of chronic diseases and disability among men and women aged 50-74 years in the US, England and Europe, the highest prevalence is in:**
 - A. the US
 - B. England
 - C. Europe
 - D. all three equally
- 5. According to the NHANES data between 2011-2012, edentulism rates have dropped significantly in the US. The percentage of people over 65 who are totally edentulous is:**
 - A. 52%
 - B. 35%
 - C. 27%
 - D. 19%
- 6. The major reason for low utilization of dental services by older adults (65+) is:**
 - A. lack of interest
 - B. loss of dental insurance
 - C. reduced income
 - D. B and C
- 7. According to data from the most recent NHANES study, the percentage of adults over the age of 65 reported as having periodontal disease is:**
 - A. 50%
 - B. 60%
 - C. 70%
 - D. 80%

- 8. The effects of xerostomia place an individual at risk for:**
- A. root caries
 - B. loss of teeth
 - C. inability to chew food properly
 - D. All of the above.
- 9. Two out of every three older Americans have been reported to have:**
- A. at least one chronic disease
 - B. multiple chronic diseases
 - C. more infectious diseases
 - D. overall good health
- 10. The top 4 most frequently reported chronic diseases in the US are:**
- A. cancer, emphysema, heart disease, stroke
 - B. hypertension, heart disease, asthma, cancer
 - C. stroke, chronic bronchitis, hypertension, kidney disease
 - D. hypertension, heart disease, diabetes, cancer
- 11. Periodontal disease is a chronic inflammatory disease that results in the production of cytokines that trigger the liver to produce:**
- A. C-reactive protein
 - B. Interleukin-6 (IL-6)
 - C. PGE2
 - D. TNF-alpha
- 12. The perpetuation of inflammatory biomarkers is believed to play a role in:**
- A. end-stage renal disease
 - B. atherosclerosis
 - C. stroke
 - D. All of the above.
- 13. The factor in common in diseases such as periodontal disease, cardiovascular disease and diabetes is:**
- A. hypertension
 - B. inflammation
 - C. smoking
 - D. cholesterol
- 14. Recent studies have shown that non-surgical periodontal therapy (NSPT) results in reduction of:**
- A. C-reactive protein
 - B. endothelial dysfunction
 - C. carotid intima-media thickness
 - D. All of the above.
- 15. Health care costs for one person aged 65 or older is:**
- A. the same as for someone younger
 - B. 2-4 times higher than for someone younger
 - C. 3-5 times higher than for someone younger
 - D. 4-6 times higher than for someone younger

- 16. The issue of access to care for older adults will not be resolved until:**
- A. there are more advanced dental hygiene practitioners
 - B. dentists are willing to work in institutionalized settings
 - C. legislative changes are made enabling dental hygienists to work in long-term care facilities
 - D. dental care for seniors falls under the public domain (i.e., total dental coverage under Medicare for all seniors)
- 17. The greatest cause of disability in nursing home residents is:**
- A. visual impairment
 - B. dementia
 - C. hearing loss
 - D. osteoarthritis
- 18. Dementia rates in US nursing homes are:**
- A. 25-30%
 - B. 40-50%
 - C. 57-65%
 - D. 70%
- 19. The main reason cited for the “deplorable” state of oral health in nursing homes is:**
- A. fear and aversion to the delivery of oral care by caregivers
 - B. not enough time given to caregivers for this activity
 - C. not enough oral care supplies
 - D. All of the above.
- 20. The average number of medications taken by nursing home residents has been documented as being:**
- A. 2
 - B. 4
 - C. 6
 - D. 8
- 21. One of the most important determinants for successful aging that is directly related to oral health is:**
- A. a clean mouth
 - B. psychological well-being
 - C. adequate nutrition
 - D. social contacts
- 22. The Gold Standard of care for maintaining good periodontal health that must be continued on a regular basis is:**
- A. NSPT (scaling and root planing)
 - B. chlorhexidine rinses
 - C. systemic antibiotics
 - D. fluoride rinses

- 23. In cases where multiple medications are being taken by the older adult and replacement with non-xerostomic drugs is not a possibility, what would be an appropriate solution to assist in root caries prevention?**
- A. prescription of a sialogogue agent
 - B. recommending use of dry mouth products such as Biotene™
 - C. application of fluoride varnish on exposed root surfaces
 - D. All of the above.
- 24. The most important part of making treatment recommendations for the aging older adult is to:**
- A. conduct a thorough assessment of the patient
 - B. assess the presence of both oral and systemic inflammation
 - C. identify all risk factors and risk indicators
 - D. do all of the above
- 25. Of all the future directions discussed for caring for the aging Baby Boomers over the next 20 years, the most important recommendation for oral health practitioners is:**
- A. increasing access to care
 - B. smoking cessation counseling
 - C. inter-professional collaboration
 - D. diet counseling

References

1. Jones LY. Great expectations: America and the baby boom generation. New York: Ballantine Books 1986.
2. WHO World Report on Ageing and Health, 2015. p.44. Accessed July 25, 2018.
3. Canadian Longitudinal Study on Aging. Canadian Journal on Aging Vol. 28 Spec. Iss 03/Sept. 2009. pp 221-229. Accessed July 25, 2018.
4. National Center for Health Statistics. Health, United States, 2013: With Special Feature on Prescription Drugs. Hyattsville, MD. 2014. p.82-83. Accessed July 25, 2018.
5. Health Care in Canada, 2011: A Focus on Seniors & Aging. CIHI (Canadian Institute for Health Information). Accessed July 25, 2018.
6. Avendano M, Glymour MM, Banks J, et al. Health disadvantage in US adults aged 50 to 74 years: a comparison of the health of rich and poor Americans with that of Europeans. *Am J Public Health*. 2009 Mar;99(3):540-8.
7. Dye BA, Thornton-Evans G, Li X, Iafolla TJ. Dental Caries and Tooth Loss in Adults in the United States, 2011-2012. U.S. Department of Health and Human Services, Centers for Disease Control & Prevention. National Center for Health Statistics. NCHS Data Brief #197. May 2015. Accessed July 25, 2018.
8. Kiyak HA, Reichmuth M. Barriers to and enablers of older adults' use of dental services. *J Dent Educ*. 2005 Sep;69(9):975-86.
9. Burt B; Research, Science and Therapy Committee of the American Academy of Periodontology. Position paper: epidemiology of periodontal diseases. *J Periodontol*. 2005 Aug;76(8):1406-19.
10. Eke PI, Dye BA, Wei L, et al. Update on Prevalence of Periodontitis in Adults in the United States: NHANES 2009 to 2012. *J Periodontol*. 2015 May;86(5):611-22. doi: 10.1902/jop.2015.140520. Epub 2015 Feb 17.
11. Centers for Disease Control and Prevention. The State of Aging and Health in America 2013. Atlanta, GA: Centers for Disease Control and Prevention, US Dept. of Health and Human Services; 2013. Accessed July 25, 2018.
12. Löe H. Periodontal disease. The sixth complication of diabetes mellitus. *Diabetes Care*. 1993 Jan;16(1):329-34.
13. Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: a two-way relationship. *Ann Periodontol*. 1998 Jul;3(1):51-61.
14. Paraskevas S, Huizinga JD, Loos BG. A systematic review and meta-analyses on C-reactive protein in relation to periodontitis. *J Clin Periodontol*. 2008 Apr;35(4):277-90.
15. Gomes-Filho IS, Freitas Coelho JM, da Cruz SS, et al. Chronic periodontitis and C-reactive protein levels. *J Periodontol*. 2011 Jul;82(7):969-78.
16. Orlandi M, Suvan J, Petrie A, Donos N, Masi S, Hingorani A, Deanfield J, D'Aiuto F. Association between periodontal disease and its treatment, flow-mediated dilation and carotid-intima-media thickness: A systematic review and meta-analysis. *Atherosclerosis* 2014 236:39-46.
17. Teeuw WJ, Slot DE, Susanto H, et al. Treatment of periodontitis improves the atherosclerotic profile: a systematic review and meta-analysis. *J Clin Periodontol*. 2014 Jan;41(1):70-9. doi: 10.1111/jcpe.12171. Epub 2013 Oct 29.
18. Sahyoun NR, Pratt LA, Lentzner H, et al. The changing profile of nursing home residents: 1985-1997. *Aging Trends*. 2001 Mar;(4):1-8.
19. Coleman P, Watson NM. Oral care provided by certified nursing assistants in nursing homes. *J Am Geriatr Soc*. 2006 Jan;54(1):138-43. doi: 10.1111/j.1532-5415.2005.00565.x.
20. Dharamsi S, Jivani K, Dean C, et al. Oral care for frail elders: knowledge, attitudes, and practices of long-term care staff. *J Dent Educ*. 2009 May;73(5):581-8.
21. Curie RJ, DeCoster C. Assessing Manitoba's Nursing Homes: Is Good Good enough? Manitoba Centre for Health Policy 2006.
22. Jablonski RA. Examining oral health in nursing home residents and overcoming mouth care-resistant behaviors. *Annals of Long-Term Care* 2010;18(1):1-12. Accessed July 25, 2018.

23. Kuczmarski MF, Weddle DO; American Dietetic Association. Position paper of the American Dietetic Association: nutrition across the spectrum of aging. *J Am Diet Assoc.* 2005 Apr;105(4):616-33. doi: 10.1016/j.jada.2005.02.026.
24. Suvan JE. Effectiveness of mechanical nonsurgical pocket therapy. *Periodontol 2000.* 2005;37:48-71. doi: 10.1111/j.1600-0757.2004.03794.x.
25. de Oliveira C, Watt R, Hamer M. Toothbrushing, inflammation, and risk of cardiovascular disease: results from Scottish Health Survey. *BMJ.* 2010 May 27;340:c2451. doi: 10.1136/bmj.c2451.
26. Robinson PG, Deacon SA, Deery C, et al. Manual versus powered toothbrushing for oral health. *Cochrane Database of Systematic Reviews* 2009.
27. Peltola P, Vehkalahti MM, Simoila R. Effects of 11-month interventions on oral cleanliness among the long-term hospitalised elderly. *Gerodontology.* 2007 Mar;24(1):14-21. doi: 10.1111/j.1741-2358.2007.00147.x.
28. Kullberg E, Sjögren P, Forsell M, et al. Dental hygiene education for nursing staff in a nursing home for older people. *J Adv Nurs.* 2010 Jun;66(6):1273-9. doi: 10.1111/j.1365-2648.2010.05298.x.
29. Wolden H, Strand GV, Gjellestad A. Caregivers' perceptions of electric versus manual toothbrushes for the institutionalised elderly. *Gerodontology.* 2006 Jun;23(2):106-10. doi: 10.1111/j.1741-2358.2006.00114.x.
30. Lavigne SE. Effects of power toothbrushing on oral inflammation, caregiver adherence and systemic inflammation in a sample of nursing home residents. PhD Thesis, University of Manitoba, 2015. Accessed July 25, 2018.
31. Baby boomers. *wikipedia.org.* Accessed July 25, 2018.
32. Bauer M, Caviezel S, Teynor A, et al. Carotid intima-media thickness as a biomarker of subclinical atherosclerosis. *Swiss Med Wkly.* 2012 Oct 25;142:w13705. doi: 10.4414/smw.2012.13705.
33. Fogoros RN. About Health. Endothelial Dysfunction. Updated November 25, 2014. Accessed July 25, 2018.
34. Oscillating-Rotating Electric Toothbrush Technology. *dentalcare.com.*
35. The Free Dictionary by Farlex. Accessed July 25, 2018.

About the Author

Salme E. Lavigne, RDH, PhD



Salme received a diploma in Dental Hygiene (University of Toronto), a BA in Biomedical Anthropology, (Lakehead University), a Master of Science degree in Dental Hygiene (University of Missouri-Kansas-City), and a PhD (Faculty of Medicine, University of Manitoba). Salme was Coordinator, Dental Programs, Confederation College; Chair, Department of Dental Hygiene, Wichita State University and Professor & Director, School of Dental Hygiene at the University of Manitoba where she taught periodontology to both dental and dental hygiene students and medical microbiology and infectious diseases to dental hygiene students. Her research interests lie in oral/systemic medicine, periodontology and the older institutionalized adult. Salme has authored more than 25 peer-reviewed journal articles in National and International journals and 3 textbook chapters. She has delivered over 100 professional presentations in numerous countries including South Africa, Switzerland, Italy, Sweden, China, US and Australia. Salme has held numerous appointments including President, Canadian Dental Hygienists Association; Commissioner, Commission on Dental Accreditation of Canada; Chair, Canadian Foundation for Dental Hygiene Research & Education; and Councilor, Section on Dental Hygiene Education, American Dental Education Association. Salme has received Alumni of Distinction Awards from both the University of Missouri-Kansas City and the Faculty of Dentistry, University of Toronto. She is currently the Scientific Editor of the Canadian Journal of Dental Hygiene.

Email: salme.lavigne@umanitoba.ca