Acknowledgements

We would like to express our sincere gratitude to various stakeholders and individuals who provided their valuable expertise, feedback, information and support for our project. This position paper on the oral health of Saskatchewan seniors would not have been possible without kind cooperation and encouragement of following respected individuals and representatives of various associations and organizations.

Susan Anholt
Executive Director, Saskatchewan Dental Assistants' Association

Maureen Beisel
Manager, Resident Care Services/Site Leader, Parkridge Centre

Dr. Raj Bhargava
Dentist

Joyce Birchfield
Administrative Assistant, Oral Health Program
Public Health Services - Saskatoon Health Region

Suzanne Downie
Director, Nursing Practice, Saskatchewan Registered Nurses' Association

Lynsay Donald
Nursing Practice Consultant, Saskatchewan Association of Licensed Practical Nurses

Dr Brian Geller
Director of Professional Affairs, Saskatchewan Medical Association (SMA)

Chris Gordon
President, Saskatchewan Dental Hygienists' Association

Kellie Hildebrandt,
Registrar/Executive Director, SK Dental Hygienists' Association (SDHA)

Kerrie Krieg
Dental Assistant, Oral Health Program - Public Health Services, Saskatoon Health Region

Julie Laberge-Lalonde
Dental Health Educator
Oral Health Program – Public Health Services
Saskatoon Health Region

Dr. Maureen Lefebvre
Dentist

Barb Mickelson
Dental therapist, Oral Health Program -Public Health Services, Saskatoon Health Region

Cynthia Ostafie
Dental Health Educator, Oral Health Program - Public Health Services
Saskatoon Health Region

Vanessa Ripley
Continuing Care and Seniors' Health Associate, Saskatoon Health Region

Loretta R Singh
President, Saskatchewan Dental Therapists Association

Dr. Teekasingh
Dentist

Cherylee Theoret
Chief Financial Officer, Sherbrooke Community Centre and Central Haven Special Care Home

Leslie Topola
Supervisor, Oral Health Program – Public Health Services
Saskatoon Health Region

Chris Vandale
Dental therapist, White Buffalo Youth Lodge Dental Clinic

Vicki Walter
Office Administrative Assistant/Dental Assistant, Oral Health Program - Public Health Services, Saskatoon Health Region

Dr. Bernie White
College of Dental Surgeons of Saskatchewan

Dr. Chris Wyatt
Professor, Faculty of Dentistry
Chair, Division of Prosthodontics & Dental Geriatrics
Director, Graduate Prosthodontics Program
Director, Geriatric Dentistry Program
University of British Columbia

Table of Contents

Acknowledgements 2

Table of Contents 4

Introduction 6

Executive Summary 10

Oral Health Status of Seniors 24

Factors responsible for poorer oral health of elderly 27

- **I. Increasing population and associated High prevalence of chronic diseases.** 27
- **II. Seniors are retaining more teeth.** 28
- **III. Low income among older individuals.** 28
- **IV. Oral health does not appear to be a priority for the governments.** 29
- **V. Lack of awareness and recognition regarding the importance of oral health.** 31
- **VI. Lack of collaboration among health care givers and other stakeholders.** 34
- **VII. Limited geriatric training and education.** 35
- **VIII. Shortage of health care givers especially in remote and rural areas.** 37
- **IX. Non existence of oral health standards and protocols.** 37
- **X. Limited research.** 38

Significance of oral health 40

- **Poor oral health may lead to dental and oral diseases (caries, gingivitis, periodontitis, cancers)** 40
- **Poor oral health leads to denture problems.** 44
- **Poor oral health leads to social and psychological problems.** 45
- **Poor oral health leads to systemic diseases** 46

Some systemic diseases deteriorate oral hygiene and result in 51

worsening of oral health status 51

Financial Impact of poorer oral health 55

Position Statement of Canadian Dental Association on Oral Health Care for the Residents in Long-Term Care Facilities. 58

Senior's oral health programs and services in Canadian provinces. 59

Conclusion 64

Recommendations 67

Collaboration, advocacy, and lobbying. 67

More research. 71

Education and training of dental professionals and other health care givers. 72

Appendixes 73

Appendix A: Position Statement of Canadian Dental Association on Oral Health Care for the Residents in Long-Term Care Facilities. 74

Appendix B: Dental Services Comparison by Province 76

References 81

Introduction

Health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[1] While "Oral health is part of total health and essential to quality of life."[2] Donna E. Shalala U.S. Secretary of Health and Human Services described that "Oral health is integral to general health...you cannot be healthy without oral health".[3] Oral health is the vital component of general health, however, oral health of seniors particularly those residing in long term care facilities, home bound elderly and community dwelling older adults who have problems in accessing oral care is overlooked at various societal, professional and government levels.

Advancement in medicine and availability of sophisticated treatment, improved income and education are helping more people to survive longer with chronic diseases and disabilities resulting in reduced mobility and diminished capacity for self care.[4] As a result, the population of seniors is increasing and it is expected that one in five Canadian will be over the age of 65years by the year 2021.[5] In Saskatchewan, there were about 8514 residents in 158 licensed long term care facilities in 2005, and their number is estimated to increase by more than 20% over the next ten years.[6] Chronic diseases, physical and cognitive disabilities and side effects of medications among older adults impair their daily activities and increase the risk for oral diseases.[7]

The trends show that seniors are retaining more teeth due to fluoridation of water, better access to dental treatment, improved income, enhanced dentist to population ratio and growth of dental insurance; for example there were 48% of individuals aged 65 and over without teeth in 1990 but this proportion dropped to 30% in 2003.[6] A recent pilot project in Saskatoon and Regina reported that the proportion of edentulous residents of long term care homes ranged from 43% to 57%. The

retention of natural teeth makes caries and periodontal diseases life time concerns for the older people.[8]

Because of several common risk factors, poor oral health and poor general health are interconnected and there is strong association between periodontal diseases other medical conditions such as diabetes, ischemic heart diseases, and chronic respiratory diseases etc.[9] Oral diseases not only affect general health, but also influence emotional, psychological and social well being through eating, speech, laughter and facial expressions.[10]

Oral conditions can be extremely painful and thus can affect the quality of life of individuals and can aggravate behavioural issues among elderly.[11] Although, oral health problems are the most prevalent chronic diseases among older adults access to oral care is also a problem for them. For example, 70% of elderly people aged 65 and older can independently visit a dental office where as 20% need assistance from a health care worker, another 5% homebound and 5% are institutionalized also have access problems.[12] Only 9 to 25% of seniors in institutions visit a dentist once a year and 30 to78% see a dentist in over 5 years.[13]

Compared to the other groups of our population, the elderly utilize less dental services. A comparison of elderly Canadian's dental attendance with U.S and U.K over one year shows that their attendance is half that of America and Britain.[14] Though, there is involvement of dentists, denturists and dental hygienists during recent years in providing care to the elderly, oral health care and proper oral hygiene remains the biggest challenges for them.[15] As mentioned above that oral health is inseparable from oral health but governments and policy makers appear to be least concerned about this silent epidemic. One of the reasons for the lowest priority to oral health may

be due to the historical fact that development and practice of health policy was dominated by the profession of medicine over the last century, therefore oral health was not included in primary health care.[16] For example, In Saskatchewan, oral care expenditure for seniors is only $139,856 per year compared to $149,909,217 expenditure for physician services in 2002/2003, making this almost one dollar per senior per year for oral care.[17] While research shows strong association between poor oral health and severe systemic diseases however oral diseases are generally not considered life threatening.[18] Oral health care, even of the residents of long term care facilities, carries the least preference and this has not changed over the past quarter century.[19] Policy makers must utilize the concept of “compression of morbidity” which focuses on aggressive preventive health measures and management of diseases to improve oral health and quality of life, and obtain successful aging for our older adults.[20]

“A human right is a claim that persons have on society by virtue of their being human. In the good society, individuals have a moral claim to oral health because oral health is a necessary condition for the attainment of general health, wellbeing, and the pursuit of other basic human rights acknowledged by the society.”[21] One of the doctrines of Canada Health Act is that health care is fundamental right of all Canadians, and principles of Canada Health Act such universality, portability, accessibility, public administration, should be applied to the oral health of our elderly population. [22]

Social justice is the foundation of public health which means equity and fairness. The first step to understand the meaning of justice is to perceive the severity and the magnitude of burden of disease and disability experienced by our elderly. Better understanding of social justice would help

us to realize our responsibilities towards caring for our older population. We must reconnect the mouth to the body of public health, and strongly influence policy makers and government to give due significance to the oral health of our seniors regardless of their socioeconomic status, gender, race and ethnicity.[16,22] It is the duty of government, policy makers, medical profession, dental profession, allied health professions, public health agencies, and various associations and segments of our society to work collaboratively to establish a comprehensive oral health care systems for the elderly population of our province. We must give them their basic rights, to avoid wastage of our health care dollars, to prevent a looming public health crisis, and to be a role model for other Canadian provinces. Our seniors have contributed greatly to the development and well being of our society and they deserve to be provided with the best oral health care.[23]

Executive Summary

Oral health of seniors is considered a public health crisis, and many reports, studies and international conferences have acknowledged the desperate oral health among seniors. Older adults are the fastest growing segment of the population in Canada and it is expected that they will outnumber children by 2020 in every Canadian province. Lack of provision of basic dental treatment, and oral health education and prevention programs to the residents of long term care facilities, home bound seniors and those older adults who have difficulty in accessing oral health services will result in bigger public health crisis.

The purpose of this position paper is to identify the barriers to senior's oral health, report the poorer oral health status of older adults from the pilot project done in Saskatoon and Regina and also from other studies, to recognize the impact of poor oral health on systemic diseases and quality of life of older individual and resulting financial, health and social costs to our community and health care system, to outline position statement of Canadian Dental Association, to review best practices in Canada, and to suggest recommendations to improve poorer oral health of older individuals in Saskatchewan. The author has particularly stressed upon the strong link between oral health and systemic diseases and their bi-direction, because it is extremely important to understand that poor oral health can devastate already comprised lives of older individuals by complicating chronic systemic diseases. The project included searching literature review and best practices, and gathering information, suggestions and opinion from various stakeholders, most of the them were the representative of various dental, medical, nursing associations and also

included professor and director of geriatric dentistry program and some prominent dental professionals involved in providing oral care to residents of long term care facilities.

This paper is summarized below under following headings:

Oral Health Status of Seniors.

Poorer oral health of individual residing in long term care facilities is evident from a recent Saskatchewan pilot project which involved dental examination of 137 residents at two facilities (i.e., Santa Maria LTC facility in Regina and St Anne's LTC facility in Saskatoon). According to this research, 67% of residents require dental treatment, 50% retained their teeth and 50% were edentulous, 89.5% of edentulous residents had dentures out of which 46% had faulty dentures and 71.5% of dentures were without client identification. 71.5% of the residents had dental caries (decay) out which 15.5% had pulp involvement.

Similarly poorer oral health is reported among older individuals living the independently in the community and it was found that 27% of dentate subjects required tooth extraction, more than 60% needed restorative treatment whereas 50% of edentulous individuals required prosthetic treatment.[24]

Factors responsible for poorer oral health of seniors.

There are several factors responsible for poor oral health of seniors which are summarized below.

I. **Increasing population and associated high prevalence of chronic diseases.** Older individuals particularly aged 80 years and over are the fastest growing group of population in Canada. Saskatchewan has highest percentage of seniors across the

country.[17,25] It is expected that seniors will outnumber children by 2020 in every Canadian province.[25] Since Older adults suffer more chronic diseases and physical and cognitive disabilities which predispose them to increased risk of poor oral hygiene and associated oral disorders, and also lead to decreased utilization of dental services. [7]

II. **Seniors are retaining more natural teeth.**Trends show that seniors are retaining more natural teeth over the past many decades and this trend is expected to continue, and retention of natural teeth put them at risk for dental and oral diseases such as caries and periodontal diseases.[26] For example there were 48% of individuals aged 65 and over without natural teeth in 1990 but in their proportion dropped to 30% in 2003.[5]

III. **Low income among older individuals**. Individuals with low income and no insurance do not have access to oral health care and are much more likely to have poor oral health status. (16) In Ontario, individuals with high income made more visits to dental clinics and used 26% more services than low income subjects who had more decayed teeth, more periodontal attachment loss, more dissatisfied oral health status.[27]

IV. **Oral health does not appear to be a priority for government.** Oral hygiene is the single greatest need of residents of LTC facilities and there is strong support for publicly funded oral health program. [14] However, government appears to have no priority for oral health, and this is clearly visible from the plight of oral health status of elderly and also from almost non existence of comprehensive publicly funded oral health program for the most vulnerable groups of seniors. For example, almost only one dollar per senior per year is spent on oral health in Saskatchewan. [17]

V. **Lack of awareness and recognition regarding the importance of oral health.** Access to oral health care and provision of care for older adults is associated with the attitudes and perceptions of various stakeholders which may include clients, family members, nursing team, physicians, administrators, administrative staff, dental professionals, college of dentistry, health regions, policy makers, provincial ministry of health, professional medical, nursing, allied and dental associations, and federal government health advisors/consultants. Negative influence may be because of stakeholder's perceptions or beliefs which may result from lack of awareness about the significance of oral health and lack of perceived benefits gained through the provision of oral health care to older adults. [14]

VI. **Lack of collaboration among health care givers and other stakeholders.** Lack of collaboration among various health professions and stakeholders is considered a major barrier in improving the oral health of older adults.[28] There appears lack of strong interactions within various dental associations and also with the nursing association, medical association, and other health association to address poor oral health status of older adults in Saskatchewan.

VII. **Limited geriatric training and education.** Many studies have shown effectiveness of education and training, however limited geriatric oral health training is available to dental and other health personnel which result in poor oral health of older adults. The lack of education and appropriate undergraduate training results in poor understanding of the particular needs of the older population, and also reduced ability of dental professional to treat elderly patients. [12, 29]

VIII. **Shortage of health care professionals especially dentists in remote and rural areas.** Shortage of skilled oral health professionals and staff in geriatrics also results in restricted provision of oral health care and poor oral health status among elderly.[30] There is a recognized shortage of all health care professionals especially those who have appropriate training in geriatrics; for example less that 1% of nurses are certified in geriatric nursing.[31]

IX. **Non-existence of oral health standards and protocols.** In Canadian research on nursing homes, it was found that 90% of nursing home residents needed a dental screening, 86% preferred dental treatment, 82% needed cleaning of artificial teeth and scaling of natural teeth, and 73% wanted denture labelling. [14] Saskatchewan is far behind many other Canadian provinces as far as standardized assessment tools, dental screening, routine dental examination, minimum intervention guidelines, oral health promotion and prevention programs, protocol and uniform standard for best practice in oral health care for long term care homes are concerned. [6]

X. **Limited research.** While availability of quantitative and qualitative research about the issues related to oral health of seniors is very important to influence policy makers, there appears limited such research activities. [32]

Significance of oral health

"The Mouth Is a Reflection of Overall Health and Well Being. Good oral health allows us to eat, chew, talk, smile, kiss, sleep, read, think, study, and work without oral pain, discomfort, or embarrassment."(16) Older individuals have poorer oral health status and are at greater risk of

oral disorders such as caries, periodontitis, oral mucosal lesions candidiasis, tooth loss, oral cancer, and dryness of mouth (Xerostomia). [33] The negative influences of poor oral health are more devastating on edentulous individuals. [34] Periodontal disease has been associated with systemic disease such as cardiovascular diseases, ischemic stroke, respiratory infections, diabetes, pancreatic cancer, and nutritional deficiencies and more than 100 systemic illnesses have oral manifestations. There is bidirectional relationship between periodontal disease and chronic systemic diseases. [35]

1. **Poor oral health may lead to**

I. Dental and oral diseases (caries, gingivitis, periodontitis, cancers)

II. Denture problems.

III. Social and psychological problems.

IV. Systemic diseases

V. Nutritional deficiency and weight loss

2. **Some systemic diseases deteriorate oral hygiene and result in worsening of oral health status.**

1. **Poor oral health may lead to**

I. Dental and oral diseases. Poor oral health may lead to following dental and oral problems.

Tooth Decay (Caries). Dental decay is recognized as a public health problem especially for residents of long term care facilities, homebound elders, and older individuals with dementia and low socioeconomic status. [36]

Tooth Loss. Tooth loss not only reduces chewing ability, but it is considered a risk factor for weight loss and has been associated with increased risk of ischemic stroke and poor mental health. [37] Tooth loss / edentulism is a stronger risk factor than periodontal disease and is significantly associated with ischemic stroke even in the absence of periodontal disease, although risk is slightly higher among individuals with periodontal disease. [38] A cross sectional study found higher prevalence of atherosclerotic vascular disease, ischemic heart disease, heart failure and joint disease among edentulous individuals than dentate subjects. [39]

Gingivitis and Periodontitis. Gingivitis and periodontal disease are the most common human infections (almost affecting 90% of world population) [40] It is estimated that 75% of adults suffered from periodontal disease and 20 to 30% have severe form of periodontitis which leads to destruction of supportive tissues including alveolar bone resorption.[41]

Oralpharyngeal Candidiasis. Oral candidiasis affects 34 to 51% of older adults.[42] Poor oral hygiene, denture wearing, use of antibiotics, use of systemic and inhalation steroids, malnutrition, impaired immunity, diabetes and vitamin C deficiency are risk factors associated with oral candidiasis.[42,43]

Throat and oral cancers. Oral cancer includes neoplasm of oral cavity, pharynx and lip, and it is seven times more common in individuals aged 65 years and older than those under the age of 65 years.[44] Oral cancer kills roughly one person per hour, 24 hours per day in the United States. [45]

II. **Denture problems.** Problems related to denture may include denture stomatitis, denture hyperplasia, traumatic ulcers, ill-fitting dentures, and angular cheilitis.[37] Denture wearers have a three fold increase in angular cheilitis compared to non denture wearer.[46]

III. **Social and psychological problems.** Poor oral health such as tooth loss, caries, periodontal destruction among older adults have dramatic social impacts and can devastate the quality of life, thus affecting chewing, swallowing, speaking, facial aesthetics, and interpersonal relationships.[47]

IV. **Systemic diseases.** Poor oral health leads to periodontal disease which in turn is associated with systemic diseases like diabetes, cardiovascular disease such as atherosclerosis, heart attack, coronary artery disease, congestive heart failure, rheumatoid arthritis, osteoporosis, pneumonia and pulmonary infections, ischemic stroke and peripheral artery disease. [48,49]

Cardiovascular disease. A systematic review and meta-analysis has suggested that periodontal disease is a risk factor for coronary artery disease, stroke and carotid atherosclerosis and it was found that different measures of periodontal disease confer almost a 24 to 35% increase in the risk of coronary heart disease. [41]

Dry mouth is also known as xerostomia and involves dryness of the mouth, lips and throat.[10] Aging is not associated with increased prevalence of xerostomia in older adults rather dry mouth is strongly associated with polypharmacy which is characteristic of older adults.[50]

Aspiration pneumonia. Oral care programs improve oral hygiene which in turn reduces the risk of aspiration pneumonia, improve cognitive status and alertness.[51] Various studies reported that improved oral care is associated with low risk of pneumonia; For example, mortality due to pneumonia can be reduced to about half in those individuals (both dentate and edentulous) who receive oral care compared to those patients who do not receive oral hygiene care. [52]

Diabetes Mellitus. Periodontal disease increases the severity of diabetes mellitus.[53] Periodontitis should be considered the sixth "classic" complication of diabetes mellitus because of its' remarkable similarity in mechanisms associated with periodontitis and other complications of diabetes mellitus.[54] Periodontal treatment is associated with improved glycemic control in patients with diabetes mellitus and helps to achieve long term control of diabetes mellitus.[53,55]

V. **Nutritional deficiencies and weight loss**. Poor oral health leads to nutritional deficiency among the elderly and the resulting malnutrition further deteriorates the periodontal disease. Good nutrition is useful in delaying periodontal disease and promoting healing.[56]

Some systemic diseases deteriorate oral hygiene and result in a worsening of oral health status.

Various systemic diseases have a profound effect on periodontal tissues such as blood dyscrasias, neutropenia, osteoporosis, immunodeficiency diseases, pregnancy ,renal

dysfunction, and diabetes. In addition, some medical conditions made it difficult for older individuals to take care of their oral hygiene and thus compound oral health problems.[57]

Osteoporosis. Osteoporosis is considered a risk factor for alveolar bone loss, a characteristic of severe periodontal disease.[58]

Immunodeficiency and periodontal health. A literature review reported that oral diseases were common in almost all the individuals infected with HIV.[59]

Depression. Depression is a major public health problem and individuals with depression are generally disinterested in performing their oral hygiene and frequently have reduced salivary flow, rampant dental caries, and severe periodontal disease. [60]

Dementia. Prevalence of dementia was reported to be as high as 67.4% on admission to nursing homes and as high as 72% later on.[61] Institutionalized older individuals with dementia have poor oral health and severity of oral diseases is associated with the severity of physical and cognitive impairment associated with dementia. [62]

Rheumatoid Arthritis. Rheumatoid arthritis (RA) patients have a higher prevalence of periodontal disease; for example, individuals with RA have an 8.05 fold increase odds of periodontitis compared to individuals without RA.[63]

Poly-pharmacy/over medication. The elderly may take multiple medications to control one or more chronic diseases.[64] Patients taking more drugs frequently have increased oral diseases; for example, asthmatic patients taking medications such as bronchodilators, cortisteriods may be at risk of dental decay, periodontal disease and oral candidiasis. [65]

Financial impact of poorer oral health .

There is relationship between oral diseases and other systemic diseases, therefore poor oral health could be a substantial source of morbidity and mortality particularly due to high prevalence of cardiovascular diseases.[66] Various studies indicate that fewer health care dollar expenditures are required if good oral health care is maintained. [35]

According to a 2002 analysis done in the United States, it was found that if 19,000 thousand nursing homes employed an "oral care specialist" such as a dental assistant, with an average salary of $25,000 per years plus benefits, and if a 10% incidence of pneumonia among older adults is reduced due to the improvement in the oral health brought by oral care specialist, then there would be a net cost saving of more than $300million.[67]

A comprehensive economic analysis in 2005-06 estimated that by providing oral care to older Australians aged 65 and over, $412 million expenditures on systemic complications due to poor oral health, can substantially be reduced.[68] Similarly, Saskatchewan would bear a cost of $20 million ($20,096,083) incurred to the health care system due to major systemic complications resulting from oral diseases among seniors. It is also estimated that in an ideal situation, if approximately 54% of older individuals who suffer from oral diseases in the province are provided dental treatment under publicly funded dental coverage (which almost does not exist), there would be a net saving of $ 4 million.

Recommendations.

1. Collaboration, advocacy, and lobbying. The poorer oral health status of the elderly, their complex treatment needs and oral- systemic link, call for greater collaboration among dental

associations, medical association, various nursing associations, allied health associations, college of dentistry, school of public health and other associations and organizations for advocacy and lobbying the provincial and federal governments.

a. Lobby the provincial government to create a provincial Chief Dental Health Officer.

b. Lobby provincial government and health regions to create dental public health department and develop a unique Saskatchewan multidisciplinary model of oral health care.

c. Lobby federal and provincial governments to include oral care of elderly and other vulnerable groups to be covered in the same way general health care is covered. As mentioned above, oral health is not separable from general health. Just as general health is the basic right of Canadians, so too is oral health.

d. Advocating and lobbying policy makers and Government to include Canadian Dental Association's (CDA) recommendations outlined in the Canadian Dental Association's (CDA) position statement on oral health care for the residents in long-term care facilities.

e. Advocating and lobbying government to make regulation for mandatory oral examination upon arrival of older adults in to long term care facility and annual oral examination of all the residents of long term care facilities, home bound seniors and older adults who have poor access to oral care. Regulation must be made to provide space in the long term care facilities for provision of dental treatment, procedures , oral screening and examinations. This space may be utilized by other health professions.

f. Lobby government and health regions to provide funding for mobile dental clinic vans/bus, dental supplies and denture labelling.

g. Lobby governments, health regions, Aging institute, Canadian Institute of Health Research, office of chief dental officer to provide funding for research in the area of geriatric oral health.

h. Lobby government and health regions to develop strategies for the oral health promotion and prevention of oral diseases using common risk approach.

i. Lobby government and health regions to provide incentives to geriatric health care workers, especially to dental care givers to overcome the shortages or mal-distributions. A fee guide specific to geriatric dental services should also be developed.

j. Collaboration among College of Dentistry, Health Region and School of Public Health and associations for awareness and recognition that oral health is intrinsic to general health.

k. Collaboration among various disciplines of dentistry and other health association to develop oral health standards, protocols, oral screening programs, oral health assessment and examination, oral health promotion and prevention programs, oral health information for minimum data set informed consent.

2. More research.

a. Research in to oral health needs of older individuals, their preferences, attitudes and beliefs towards oral care.

b. research into the issues faced by patients, caregivers, administrators , and health regions.

c. research in to data collection about different oral diseases among older adults and their association with systemic diseases.

d. research in to assessing the financial burden due to poor oral health status among geriatric individuals.

e. research in to the evaluation of impact of nursing home regulation, oral health assessment and examination programs, and oral health standards and protocol.

f. Research in to assessing the most effective training program for nursing staff, and other caregivers regarding oral needs of elderly.

g. Research in to evaluating the most cost effective and best of model of delivery of oral health program.

3. Education and training of dental professionals and other health care givers.

a. Geriatric dental courses must be included in curriculum of various programs of dentistry, medicine, nursing and allied health professions.

b. Training programs for geriatric oral health must be offered to the health care providers particularly nursing assistants, and other nursing staff.

c. Geriatric oral care residency programs should be available to dental and medical graduates.

d. Provision of continuing education and training to those health care providers who want to acquire skills and expertise in geriatric oral health.

Oral Health Status of Seniors

Saskatchewan Study.

Recently a study was done to determine the oral health status and cost of dental treatment required for residents of long term care facilities in Saskatchewan. The pilot project involved providing dental examinations to 137 residents at two facilities (i.e., Santa Maria LTC in Regina, and St. Anne's LTC in Saskatoon). According to this research, the average age of residents is 86years, the male to female ratio is 29/71; 67% required dental treatment, 50% had retained their natural teeth and 50% were edentulous. Approximately 89.5% of edentulous residents had dentures out of which 46% had faulty dentures and 71.5% of dentures were without client identification; 71.5% of the dentate residents had dental caries (decay), out of which 15.5% had pulp involvement.

Other Canadian studies. Results of the pilot project in Saskatchewan are similar to other studies done in Canada. A study of 1375 elderly aged 85 and older in North York, Canada found that 31 % of dentate residents of nursing homes and 47% of independently living elderly had received dental care in the previous year. Among the nursing home residents, 60 % of dentate individuals had

untreated dental decay, 47% exhibited untreated root decay, 45% required tooth extraction and 56% needed prosthetic treatment while 70% of edentulous nursing home subjects required prosthetic treatment. Among the independently living older adults, 27% of dentate subjects required tooth extraction, more than 60% needed restorative treatment whereas 50% of edentulous individuals required prosthetic treatment.[69] In another study of adults aged 50 and older living independently, it was found that 30.5% were unable to chew one or more foods and had problems with communication and social interaction, 37.2% experienced oral or facial pain during the last four weeks and 67.5% reported one or more oral symptoms.[70] Research involving 41 LTC facilities in Vancouver, British Columbia, reported that more than 50% of denture wearer had thick layer of plaque on their dentures and 11 % of dentate residents had extremely mobile teeth.[71]

UK study.

Many residents of nursing homes cannot perform their own oral care, and it was found that 72% to 84% of institutionalized people had difficulty in brushing their teeth, and 78% to 94% of denture users had problems in cleaning their dentures.[67]

Despite high prevalence of dental diseases and problems among seniors residing in LTC facilities as well as living independently, the utilization of oral health care was lower among them.[72] For example, only one third of residents of long term care facilities had not seen a dentist in more than five years. (67) Overall seniors have poorer oral health because there is almost non-existence oral health care system for nursing home residents or dental outreach programmes in Canada, a fact recognized during the first international Conference on Geriatric Dentistry held in Montreal.[73]

The US Surgeon General's 2000 report on oral health recognized the devastating oral health of older individuals as "silent epidemic of profound and consequential dental problems" . [25]

Factors responsible for poorer oral health of elderly

The complex nature of oral health among older individuals is due to many factors at various administrative, professional, societal, and government levels.

I. Increasing population and associated High prevalence of chronic diseases.

Seniors, particularly aged 80 years and older, are the fastest growing group of the population in Canada. [25] The growth of the elderly is expected to accelerate in 2011 when the first baby boomers will turn 65years old. The number of elderly Canadians will increase from 4.2 million in 2005 to 9.8 million in 2036.[74,75] It is projected that one in five Canadians will be over the age of 65years by the year 2021, and seniors will outnumber children by 2020 in every Canadian province. [5,25] In Saskatchewan there were 147,630 seniors in 2004 which is 14.8 percent of the population and this percentage was highest in Canada. [17] Saskatchewan is also unique in that it has the largest proportion of very elderly people (i.e., 80 years and older) among all Canadian provinces .[75] The life expectancy has increased for the residents of Saskatchewan, and men at the age of 65 year is expected to live another 17.1 years while women can live another 21 years. [17] Increasing age is accompanied with the multiple chronic diseases and physical and cognitive disabilities. About 68% of older adults are afflicted with one chronic conditions such as Alzheimer's disease or dementia, effects of stroke, osteoporosis, heart diseases and incontinence, and two out of three residents of long term care facility had more chronic disease than four years back and this trend is expected to increase if population remains in poorer health.[76] Chronic diseases and

associated physical and cognitive disabilities predispose patients to increased risk of poor oral hygiene and associated oral disorders such as caries, periodontal disease, tooth loos and also lead to decreased utilization of dental services. [7]

II. Seniors are retaining more teeth.

Older adults are retaining more natural teeth over the past several decades and this trend is expected to continue. Retention of natural teeth will put them at risk for dental and oral diseases such as caries and periodontal diseases. [26] The trend of retaining more natural teeth over the past decades is due to fluoridation of water, fluoride tooth pastes, better access to dental treatment, improved income, enhanced dentist to population ratio and growth of dental insurance; for example there were 48% of individuals aged 65 and over without teeth in 1990 but this proportion dropped to 30% in 2003. [5]

III. Low income among older individuals.

Individuals with low income and no insurance do not have access to oral health care and are much more likely to have poor oral health status. [16] Dental treatment is expensive and low income and middle income cannot afford it. [77] Even individuals with low income retain fewer teeth than those with high income. For example, only 30% of people with a household income of less than $15,000 per year retained natural teeth while 41% to 73% of individuals with high income maintained their teeth. [26] In Ontario, individuals with high income made more visits to dental clinics and used 26% more services than low income subjects who had more decayed teeth, more periodontal attachment loss, poorer self-perceived oral health and more dissatisfied

oral health status. Low income individuals aged 65 and older were seven times less likely to have dental insurance compared to high income individuals aged 25 to 44 years.[27] According to Oral Health Module of the Canadian Health Measurement Survey, 32% of Canadians have no dental insurance. 17% of the population avoided visiting a dental professional and another 16% avoided comprehensive recommended dental treatment because of the cost. [78] In Saskatchewan, low income is concentrated more among elderly women than the men, and 71% of residents of long term care facilities are women according to Saskatchewan dental pilot project. [79]

IV. Oral health does not appear to be a priority for the governments.

Various Canadian surveys show strong support for publicly funded oral health program. For example, in a survey of 24 nursing homes, more than 90% of nursing homes were interested in having an oral health care program provided by the public health department of the health region, and the same proportion of nursing homes were also willing to offer support for such publicly funded dental health program. [14] Most of lowest income Canadians prefer publicly funded dental care, and 80.9% of dentists believe that oral health care should be provided in public settings. [80] According to a survey done at the Royal University Dental Department Saskatoon, Saskatchewan, more than 90% of special care needs patients prefer to use hospital based dental services if available in the health region and more than 80% of dentists prefer to treat such patients in the hospital setting.[81] Approximately 72% of residents of long term facilities reported that routine oral hygiene is their greatest single need in a survey of 1063 individuals from 31 nursing home. [82]

Despite strong demand from the public as well as strong support from dental community for a publicly funded oral health program, government appears to have no priority for oral health. Poorer oral health of elderly is a much bigger issue than commonly understood and governments are not aware how big this crisis could be. [83] Only 6% of Canadian have public dental insurance. [78] In Saskatchewan, almost one dollar per senior per year was spent on oral health in Saskatchewan 2002/03. [17] More than 60% of special need patients in Saskatchewan have more than 2 years of wait time, according to a study done in Saskatoon. [81] But there appears to be no oral surgery capacity in announced plans for publicly funded Surgical Centres in Saskatchewan.[6] Out of 12 health regions in Saskatchewan, none have an established dental public health department to cater the oral health needs of the community, particularly the elderly. This is ironic to see that out of approximately 1,650 staff members there is only one dental caregiver (a dental therapist) in Cypress health region looking after the oral health needs of a population of 44,000 individuals.[84] Some long term facilities have been designed to provide services such as hair salons but there is no regulation to support the allocation of space for oral health care.[85] A survey of nursing assistants reported that non- availability of dental supplies (such as tooth brushes, fluoride tooth pastes, mouthwashes, denture storage containers and cleaning tablets) is one of the greatest barriers to the oral health of seniors.[86] But there is no provision of such dental supplies to the homebound elderly as well as to the residents of long term care facilities in Saskatchewan.

A Chief Dental Officer can play a significant role to improve the oral health in the province by establishing collaborations with other organizations, associations and institutes, developing oral health programs and research projects and by resolving regulatory, scope of practice and other issues among the different disciplines of dentistry. However, no such position exists in Saskatchewan.

V. Lack of awareness and recognition regarding the importance of oral health.

Access to oral health care and provision of care for older adults is associated with the attitudes and perceptions of various stakeholders which may include clients, family members, nursing team, physicians, administrators, administrative staff, dental professionals, college of dentistry, health regions, policy makers, provincial ministry of health, professional medical, nursing, allied and dental associations, and federal government health advisors/consultants. The negative influence may be because of stakeholder's perceptions or beliefs which may result from lack of awareness about the significance of oral health and lack of perceived benefits gained through the provision of oral health care to older adults. [14]

Older adults lack knowledge about the consequences which can arise from poor oral health. Factors such as age, personal experience with dental professionals, past and present socio-demographic environment, financial ability to pay for oral health care, level of education, number of remaining teeth, level of cognitive impairment, level of functional dependency, availability of dental resources in the community, and administrative support and expectations of family, determine the level of oral care an individual would seek. [87] Poor overall health, apprehension and concerns about new

situations, anxiety about going out in public due to missing teeth (aesthetic issues), unwillingness to be transported to a dental clinic, may result in low utilization of oral health care services. [88] Though regular dental visits are important both for edentulous and dentate older adults, only 34% of elderly Canadians aged 65 and over visited a dentist in the last year where as 87.5% visited primary care physician in 1994.[89, 33] Elderly only seek oral health care when they perceive a problem.[12] It was stated approximately fifty years ago that state of patient's mouth could reflect the overall standard of nursing care. [90] According to a survey, the residents of long term care homes give highest significance to oral hygiene compared to bathing and toileting. [91] However, the least attention is given to the oral health of the residents by nursing staff. A study was designed to assess that how much importance is given by the nursing assistants to oral hygiene, and it was found that only 16% of residents received oral health care and the average time for tooth brushing was only 16.2 seconds. [67] Nurses are reluctant to provide oral care to elderly because mouth care assistance is perceived as more unpleasant, trivial, and unrewarding than other nursing activities. [31] Registered nurses have a better attitude and knowledge towards oral health care but they are not generally involved in daily practice of oral hygiene which usually is the responsibility of nursing assistants. [92] Mouth care-resistive behaviours have been reported among older adults and include not opening mouths, refusal to accept mouth care, biting the toothbrush, hitting, kicking and biting nursing assistants. However, it has been found that resistant behaviour among the elderly is generally due to a lack of appreciation or encouragement for residents by nursing assistants, insertion of the

tooth brush in to resident's mouth without prior communication with them, or lack of smiling or positive facial expressions or gestures.[93] High staff turnover, increased work loads or high client to staff ratios are associated with a low preference for oral care among nursing staff. [94] Nurses can play a significant role in improving the oral health status of nursing home residents by recognizing the importance of oral health and further recommending and supporting best practices in oral care.[90]

Similarly, many dentists do not prefer to treat frail elderly because they are faced by many issues such as limited financial reward due to extra time that is spent in treating such residents, billing and treatment scheduling issues, problems related to consent, and lack of proper dental equipment and non-availability of proper space in long term care facilities, lack of cooperation from residents, staff, and administrators, and the lack of continuing education and training in geriatrics. A study done British Columbia in 2008 found that only 15% of dentists are providing dental treatment in long term care facilities and 19% of those dentists who used to provide oral care in these settings have stopped giving oral health care. [74] Even if is extremely difficult to provide dental treatment to the uncooperative elderly in a private dental clinic. For example, in a Saskatchewan study, it was found that uncooperative patients with various disorders may put extra stress on dental staff, complicate the dental treatment and upset the usual dental office environment. [81]

When older adults need help, they generally contact their family members, and support from families is considered very important as far as provision of oral care is concerned.[95] The residents who have physical and cognitive impairment may require

more help from their family members and sometime consent is also needed. Lack of family support is a barrier to accessing oral care for the frail elderly. For example, a study found that those residents who required a family member as their main supporting person were less likely to visit a dental clinic than those who did not need family help. (89) Administrators may lack awareness about the significance of oral health, thus are unable to fulfil their role in improving the oral hygiene of residents. [96] The implementation of effective and suitable oral health policies can improve oral health status of older adults, but policy makers give low priority to oral heath because oral diseases are not considered life threatening or oral health is not recognized as "sick care".[97, 21] Historically, policy development and practice were dominated by the profession of medicine, therefore oral care was not part of primary health care. [16] Policy makers do not recognize the strong association between poor oral health and various systemic diseases, and resulting health, social, financial (dental diseases are third most costly diseases in Canada), and emotional costs. [18]

VI. Lack of collaboration among health care givers and other stakeholders.

Lack of collaboration among various health professions and stakeholders is considered a major barrier in improving the oral health of older adults.[98] For example, oral health in America: A Report of the Surgeon General, has called for collaboration among dental, medical, nursing and allied health professions to decrease the oral health inequalities for older adults. The American Academy of Nursing and Pew Health professions Commission in the United States also have stressed the need for a collaborative approach to address the complex needs of elderly which go beyond the capacity of a

single health discipline. [31] Although the nursing profession recognizes the significance of oral health for older adults there has not been any collaboration between nursing professions with dental professions to promote oral health and prevent oral disorders. [31] There appears to be a lack of interaction between the dental association, nursing association, medical association, and other health associations to address poor oral health status of older adults in Saskatchewan. Interdisciplinary collaboration has been recognized as a solution to address oral disparities among older adults and partnerships between dental profession and other health professions would help to enhance awareness about the oral health crisis of our older population, promote oral health assessment tools, standards and protocols which would result in better oral health and quality of life for older adults. [99],[100]

VII. Limited geriatric training and education.

The lack of education and appropriate undergraduate training results in a poor understanding of the particular needs of the older population. The limited experience of working with geriatric patients would result in reduced ability of dental professional to treat elderly patients. [29, 12] A U.K study assessed the effectiveness of training and education among nursing staff. Intensive oral health training was given to staff of five long term care facilities. At the beginning of study, there were oral mucosal disorder and dryness of mouth. After training it was found that there was significant reduction in oral mucosal diseases particularly angular cheilitis and denture stomatitis, as well as a decline in the number of residents wearing dentures at night, and there was major improvement in denture hygiene. [101] Though nursing assistants have the responsibility

for mouth care and the oral health of residents, they have minimal oral health care training. [94] Education of nursing staff should focus on the importance of oral health, oral health assessment, methods of providing daily oral hygiene, dental supplies, systemic complications of poor oral hygiene, consequences of poor oral health on the quality of life, and tools to deal with patients who offer resistance in receiving oral care.[102] Medical doctors also lack sufficient oral health care education and training during their medical school and residency. For example, there were only 37.7% of Canadian family physicians who received oral health training in their undergraduate program of study and 51% reported that physicians can play a significant role in improving the oral health.[103] Similarly surveys reported that 40 % of American physicians did not receive oral health training in their medical school and residency and 90% supported the inclusion of oral health interventions in to general health visits.[104] According to a study done in Saskatchewan, the highest proportion of dentists treating special health care patients reported that their undergraduate training motivated them to treat such patients, and approximately 50% of special care needs patients preferred to have treatment from dentists who had appropriate training in special care needs.[81] It is estimated that Canada would need at least 600 fully trained geriatric dentists and 200 minimally trained dentists to take care of the aging population's oral health needs by 2020.[25] It is important that caregivers understand the psychological, cultural, educational, social background, financial status, dietary conditions and particular life experience of the patients. Caregivers should have a positive attitude, knowledge, and

ability to communicate with elderly patients, diagnose and perform specialized procedures for elderly patients.[105],[106]

VIII. Shortage of health care givers especially in remote and rural areas.

Shortage of skilled oral health professionals and staff in geriatrics also results in restricted provision of oral health care and poor oral health status among elderly. [31] There appears to be shortage of dentists particularly in rural, northern and remote areas of Saskatchewan. Only 13% of dentists practice in these areas, and the dentist to population ratio was 1 to 2,632 individuals in Saskatchewan in 2007, whereas WHO states that the ideal dentist to population ratio is 1 to 1200 in industrialized countries. It has been reported that only 13% of dentists and dental specialists have their practices in rural or northern communities of Saskatchewan.[6] In the case of poor access to oral health services due to the shortage of dentists, dental hygienists and dental assistants, older individuals depend on physician and nursing staff who may not have appropriate education and training in oral health care which further deteriorates oral health of older adults.[30] There is a recognized shortage of all health care professionals especially those who have appropriate training in geriatrics; for example less that 1% of nurses are certified in geriatric nursing.[31]

IX. Non existence of oral health standards and protocols.

In recent Canadian research on nursing homes, it was found that 90% of nursing home residents wanted dental screening, 86% preferred dental treatment, 82% needed cleaning of artificial teeth and scaling of natural teeth, and 73% wanted denture

labelling.[14] Similarly, according to pilot project in Saskatchewan, 71.5% of denture wearers in the long term care facilities required denture labelling.

The American Cancer Society recommends annual oral examination for individuals age 40 years or older, and a regular dental visit for individuals 65 years or older is recommended by the US Preventive Services Task force.[30] However, Saskatchewan is far behind many other Canadian provinces as far as standardized assessment tools, dental screening, routine dental examination, minimum intervention guidelines, oral health promotion and prevention programs, protocol and uniform standard for best practice in long term care homes are concerned.[6]

X. Limited research.

Availability of quantitative and qualitative research about the issues related to oral health of seniors is very important to influence policy makers.[32] Recently a pilot project was done in Saskatoon and Regina to assess the oral health status of residents of long term care facilities as well as the cost of dental treatment for those who require oral care. More data is required from various health regions tom comprehensively evaluate the oral health needs of older adults living in long term care facilities, of home bound seniors, and other vulnerable groups of elderly who have difficulty in accessing appropriate oral care. There are many areas of seniors' oral health that need research. Research is needed on the impact of poor oral health on the systemic diseases and their economic analysis, the evaluation of various preventive oral programs, and evaluation of the best models of delivery of care for the elderly. Lack of research into various

107

Significance of oral health

"The Mouth Is a Reflection of Overall Health and Well Being. Good oral health allows us to eat, chew, talk, smile, kiss, sleep, read, think, study, and work without oral pain, discomfort, or embarrassment." [16] Periodontal disease has been associated with systemic disease such as cardiovascular diseases, ischemic stroke, respiratory infections, diabetes, pancreatic cancer, and nutritional deficiencies and more than 100 systemic illnesses have oral manifestations. There is a bidirectional relationship between periodontal disease and chronic systemic diseases.[35]

Poor oral health may lead to dental and oral diseases (caries, gingivitis, periodontitis, cancers)

Tooth Decay (Caries). Dental decay is recognized as a public health problem especially for residents of long term care facilities, homebound elders, and older individuals with dementia and low socioeconomic status. [36] Dental decay is infectious disease and associated with multiple factors such as insufficient salivary flow, increased exposure to fermentable carbohydrates, suboptimal use of fluoride, physical and cognitive disabilities, multiple medications and medical conditions.[108] Susceptibility of the tooth, quantity and quality of bacteria, type of bacteria, and duration of fermentable carbohydrate exposure are important factors in the development of dental decay.[109] According to the oral Health module of the Canadian Health Measurement Survey, 96% of adults have a history of cavities. According to a pilot study in Saskatchewan, 43 to 67% of dentate residents of long term care facilities have dental caries. [78] It is also reported that almost one in five elders has untreated dental decay, and they may develop new dental caries at a higher rate than children.[10] The annual caries attack rate in older adults was estimated to one

new carious surface per person per year which is equal to or higher than the caries attack rate on children.[98] Frail elderly who are dependent on caregivers were reported to have 3.8 times more dental caries and 4.5 times more coronal decay compared to those older individuals living independently.[110] In another study of the elderly aged 79 years and over who had retained 19 teeth, it was found that 96% had coronal dental caries experience and 64% had root caries experience.[108] Dental decay may lead to pain and infection which not only limit one's ability to eat but also affect overall quality of life.[21] Treatment of caries in older adults may not alone control this public health problem, therefore prevention strategies involving proper diet, oral hygiene, and antimicrobial agents must be developed and implemented.[110]

Tooth Loss. Although there is a trend, over the past few decades, of reduced incidence of tooth loss among older adults but the number of tooth loss increases with age, and residents of long term care facilities have few teeth due to their poorer oral health status.[111] A study assessing the 13 -15 year tooth loss incidence among individuals aged 65 and older reported that most commonly lost teeth include molars while least commonly lost teeth were canines and maxillary incisors, and the number of remaining teeth significantly affected individual's ability to eat food, swallow and smile and compromise the quality of life of individuals.[112] Tooth loss not only reduced chewing ability, but is considered a risk factor for weight loss and has been associated with increased risk of ischemic stroke and poor mental health.[9] Tooth loss / edentulism is a stronger risk factor than periodontal disease and is significantly associated with ischemic stroke even in the absence of periodontal disease, although risk is slightly higher among individuals with periodontal disease.[38] A cross sectional study found higher prevalence of atherosclerotic vascular disease, ischemic heart disease, heart failure and joint disease among edentulous individuals than

dentate subjects. [39] A prospective study involving 45,136 male health professionals who were without cardiovascular disease at baseline reported that tooth loss was significantly associated with peripheral arterial disease (PAD) among the individuals with periodontal disease.[113] Reduced masticatory ability due to tooth loss is associated with low intake of protein, carbohydrates, fibre, most vitamins, and minerals.[114] Therefore, edentulous patients with poor nutrition may be at a risk of various diseases. For example, a low intake of vitamin A, E, and C is associated with cancer, heart disease and rheumatoid arthritis, Parkinson disease, and reduced immune response. [40]

Brittleness and wear of teeth. The dental pulp is reduced in old age, and it has fewer blood vessels, and lesser nerve tissue, and the fluid content of teeth also declines making teeth brittle.[115] It not uncommon to find older adults with more tooth wear since tooth wear is associated with normal aging process. For example, a study suggested that individuals aged 65 years and older had a three times higher pathological tooth wear compared to adults age 26 to 35 years.[116] Tooth wear can be attrition (wear of tooth against tooth), erosion (wear caused by acids) or abrasion (wear of tooth against other surfaces) and treatment depends on identifying the underlining etiology. [116,117] Individuals with severe tooth wear usually have difficulty in chewing, tooth sensitivity, aesthetic problems and phonation disorders. [117]

Gingivitis and Periodontitis. Gingivitis and periodontal disease are the most common human infections (almost affecting 90% of world population), gingivitis involves inflammation of gingiva (gum) due to accumulation of dental plaque and can develop within few days while periodontitis results from chronic gram negative anaerobic infection and from chronic inflammatory response of supporting periodontal tissues. [40,117] It is estimated that 75% of adults suffer from periodontal

disease and 20 to 30% have a severe form of periodontitis which leads to the destruction of the supportive tissues including alveolar bone resorption. [41] Approximately one in seven elderly suffer from severe periodontal disease (6mm or more of attachment loss involving one or more teeth) which increases with age. [27] Certain disorders such as haematological, genetic, dermatological, immunosuppressive, granulomatous and cancerous can have periodontal manifestations, and dental treatment procedures can result in transient bacteremia, and even gentle mastication can release endotoxins in to the blood circulation of patients with periodontitis. [117,118] As mentioned earlier, periodontal disease has been associated with systemic disease such as cardiovascular diseases, ischemic stroke, respiratory infections, diabetes, pancreatic cancer, and nutritional deficiencies and more than 100 systemic illnesses have oral manifestations. There is bidirectional relationship between periodontal disease and chronic systemic diseases.

Oralpharyngeal Candidiasis. Oralpharyngeal candidiasis is an opportunistic infection of oral cavity caused most commonly by Candida Albicans. Denture stomatistis, thrush, angular cheilitis, and acute atrophic glossitis are the main clinical types of oral candidiasis.[119] Oral candidiasis affect from 34 to 51% of older adults. Poor oral hygiene, denture wearing, use of antibiotics, use of systemic and inhalation steroids, malnutrition, impaired immunity, diabetes and vitamin C deficiency are risk factors associated with oral candidiasis. [42,43]

Throat and oral cancers. Oral cancer includes neoplasm of the oral cavity, pharynx and lip, and it is seven times more common in individuals aged 65 years and older than those under the age of 65 years.[44] There were 35,310 estimated new cases of oral cavity and pharynx cancers with 25,300 in men and 10,000 in women in US in 2008.[120] Oral cancer will cause the death of approximately 8,000 Americans, killing roughly one person per hour, 24 hours per day.[45] There were 3090 cases

of oral cancer and 1070 deaths in Canada in 1996.[27] Oral cancer can result from the prolonged consumption of tobacco and alcohol over a period of years. [44] Periodontitis is also associated with oral and head and neck carcinoma. For example, a case-control study of individuals with squamous cell carcinoma of the tongue estimated that each millimetre of alveolar bone loss due to periodontal disease was associated with a 5.23 fold increase in the risk of tongue cancer independent of age, race, smoking status and remaining number of natural teeth.[121] Another case-control study has reported that each millimetre of alveolar bone loss due to periodontitis was associated with more than a 4 fold increase in head and neck squamous carcinoma among individuals with periodontal disease compared to controls, and strength of this association was greatest in oral cavity, followed by oropharynx and larynx.[122] During the early stages of oral cancer, there is seldom any pain or other symptoms, therefore detection of oral cancer is primarily dependent upon clinician.[44]

Poor oral health leads to denture problems.

The percentage of elderly using dentures increases with age and more women (43%) were reported to have dentures compared to men (38%). [122] The most common type of dentures used among older adults are complete dentures. Although dentures can improve masticatory ability, intake of nutrients, and reduce discomfort while eating, there are denture related problems as well. [122,123] Problems related to dentures may include denture stomatitis, denture hyperplasia, traumatic ulcers, ill-fitting dentures, and angular cheilitis. Denture stomatitis is strongly associated with the amount of denture plaque or denture hygiene, and other risk factors include such as usage of denture at night , neglect of soaking denture at night, tobacco and alcohol consumption. [9] Denture wearers have a three fold increase in angular cheilitis compared to non denture wearer.[46]

It was reported that 62.7% of older adults who wear dentures had oral mucosal lesion (such as traumatic ulcers, denture stomatitis, and angular cheilitis), 28.5 % of non users of dentures had mucosal problems and only 8.8% of individuals with crown and bridge exhibited mucosal conditions.[124] Approximately half of dentures are ill fitting and potentially injurious to oral tissues.[115]

Poor oral health leads to social and psychological problems.

Social interactions are important for health and well being and reduced social relations pose a threat to health comparable to the hazardous effects of tobacco consumption and high blood pressure. Frail elderly are at increased risk of become socially isolated due to their physical and cognitive disabilities and this social isolation is further compounded by poor oral health such as bad breath, ugly looking broken teeth, missing teeth, ill fitting dentures and worn out teeth which are sources of embarrassment for them. [98] Many aspects of psychological and social wellbeing are affected by oral disorders, and studies have shown that those older individuals who experience psychological issue due to poor oral health significantly had lower morale and lower level of life satisfaction.[27] Poor oral health such as tooth loss, caries, periodontal destruction among older adults have dramatic social impacts and can devastate the quality of life, thus affecting chewing, swallowing, speaking, facial aesthetics, and interpersonal relationships.[125] Irregular dental visits are associated with higher level of social impact. Analysis of social impact emphasizes that oral health should be considered in the same way as general health, hence health policies should be developed to allow timely access to oral health to reduce the social impact. [(47)]

Poor oral health leads to systemic diseases

Poor oral health lead to periodontal disease which in turn is associated with systemic diseases like diabetes, cardiovascular disease such as atherosclerosis, heart attack, coronary artery disease, congestive heart failure, rheumatoid arthritis, osteoporosis, pneumonia and pulmonary infections, ischemic stroke and peripheral artery disease. [48,49]

Cardiovascular diseases.

Atherosclerotic disease (ischemic heart disease), peripheral arterial disease, ischemic stroke are among cardiovascular diseases. A recent review was done to assess the association between periodontal disease and atherosclerotic disease such as ischemic heart disease, peripheral arterial disease, and ischemic stroke, and it was found that there was suggestive evidence for a possible causal relation between periodontitis and atherosclerosis and slightly stronger evidence for ischemic stroke.[126] Another systematic review and meta-analysis has suggested that periodontal disease is a risk factor for coronary artery disease, stroke and carotid atherosclerosis and it was found that different measures of periodontal disease confer almost a 24 to 35% increase in the risk of coronary heart disease. [41] Meta-analysis of nine longitudinal studies has reported that periodontal disease may increase the risk of cardiovascular disease by roughly 20%, and risk ratio between periodontitis and stroke is even stronger.[127] Chronic periodontitis is associated with incidence of coronary heart disease independent of established risk factors including genetic and familial factors for heart disease. [66,128] A retrospective cohort study using the participants of Nutrition Canada Survey found that after adjusting for sex, age, diabetes status, total cholesterol serum level, smoking, hypertension, and province, a statistically significant association was found between periodontal disease and risk of coronary heart disease.[129] A case control study has

provided a strong evidence of an association between periodontitis and risk for acute myocardial infarction. [118] A recent systematic review has suggested a possible link between periodontal disease and Systemic Lupus Erythematosus (SLE). It was reported that since periodontitis is a well known risk factor for atherosclerosis, periodontal infection may be a risk factor for cardiovascular disease in patients with SLE, and reduction in oral infection is likely to decrease the levels of inflammatory markers common to SLE and periodontal disease.[130]

Stroke.

Strong association between periodontal disease and ischemic stroke has been reported in many studies. For example, results from two case-control studies and four longitudinal studies found the association between periodontal disease and stroke with 4 out of 6 studies showing a significant positive association.[39] Gingivitis and severe bone loss are independently associated with the risk of cerebral ischemia and individual with severe periodontitis and attachment loss of more than 6mm have 4.3 times higher risk of cerebral ischemia than the individuals with less than 3mm of attachment loss or no periodontitis.[40] Three possible pathways explain the association between oral infection and secondary diseases such as cardiovascular disease, and include: metastatic infection, due to transient bacteria; 2) systemic vascular injury because of microbial endotoxins; 3) systemic inflammation from immunologic damage caused by oral bacteria. [48]

Dry mouth

Dry mouth, also known as xerostomia, involves the dryness of in the mouth, lips and throat. Dry mouth is the sign of certain medical conditions such as diabetes, Parkinson's disease and Sjogren's syndrome.[10] Dry mouth is a commonly reported oral condition in elderly and its prevalence range from 20% to 40% in community dwelling older individuals even higher in women than men.[50] Aging

is not associated with increased prevalence of xerostomia in older adults rather dry mouth is strongly associated with polypharmacy which is characteristic of older adults.[50] Prevalence is almost 100% among the patients with Sjogren's syndrome and individuals with radiation therapy for head and neck cancers. Lack of saliva results in an increased risk of tooth caries and oral infection. This causes problems with denture retention, tolerance to acidic and spicy food, taste sensation, mastication, swallowing, speech, and burning of mouth and ultimately negatively impact on the quality of life.[131]

Pancreatic Cancer.

Pancreatic cancer is the fourth leading cause of cancer death in America, and diabetes and obesity is associated with pancreatic cancer while only cigarette smoking is an established risk factor. Dominique S. Michaud et al, observed, in a study of 51529 male health professionals aged 40-75 years, the association between periodontal disease and pancreatic cancer. He found that individuals with periodontitis had increased risk of pancreatic cancer compared to those without periodontal disease.[132]

Aspiration pneumonia.

Oral care programs improve oral hygiene which in turn reduces the risk of aspiration pneumonia and improves cognitive status and alertness.[51] Pneumonia is an important cause of morbidity and mortality in elderly. Though four possible pathways have been reported for micro-organisms to infect lower respiratory tracts: 1) aspiration of oropharyngeal matter, 2) inhalation of contaminated aerosols, 3) spread of infection from infected sites, and 4) hematogenous spread from extrapulmonary sites of infection but aspiration is the most common route.[133] Micro-organisms of dental plaque associated with periodontal disease may lead to aspiration

pneumonia.[134] Dysphagia is considered an important risk factor for aspiration pneumonia.[135] Older Individuals with cerebrovascular and neurologic diseases may have dysphagia and impaired cough reflex which increase the likelihood of orophyrngeal aspiration.[136]

Various studies reported that improved oral care is associated with low risk of pneumonia. For example, almost one in 10 cases of death can be prevented in the residents of long term care facility by improving their oral hygiene.[137] In a study of 24 months, it was found the 2 out of 40 (5%) older individuals who underwent professional oral health care (POHC) died of pneumonia while 8 of 48 (16.7%) elderly who had no professional oral health care died of pneumonia.[138] Morality due to pneumonia can be reduced to about half in those individuals (both dentate and edentulous) who receive oral care compared to those patients who do not receive oral hygiene care. [52]

Diabetes mellitus.

Periodontal disease increases the severity of diabetes mellitus.[53] Periodontitis should be considered sixth “classic” complication of diabetes mellitus because of remarkable similarity in mechanisms associated with periodontitis and other complications of diabetes mellitus.[54] Prevalence of diabetes in Ontario increased by 69% over a period of 10 years from 1995 to 2005. [54] Diabetic patients lose teeth more frequently than healthy individuals.[139] Impaired immune response, abnormal collagen metabolism, vascular changes and altered oral flora may be associated between diabetes mellitus and periodontitis.[140] Periodontal treatment is associated with improve glycemic control in patients with diabetes mellitus and helps to achieve long term control of diabetes mellitus. [53, 55]

Poor oral health leads to nutritional deficiencies and weight loss.

Oral diseases leads to nutritional deficiency among elderly and resulting malnutrition further deteriorates the periodontal disease because good nutrition is useful in delaying periodontal disease and promoting healing. [56] Poor oral health and loss of teeth leads to a decrease in eating and chewing ability resulting in a reduced intake of nutrition and weight loss which further compromises many already malnourished older individuals. For example, 5 to 10% of community dwelling older adults, and 30 to 60% of homebound and institutionalized elderly are malnourished. Additionally weight loss has been associated with increased morbidity and mortality, and those with no natural teeth are twice likely to experience weight loss.[27] Older individuals with more functional posterior teeth are associated with low risk of weight loss. [140] Approximately 72% of male seniors and 59% of female elderly in Saskatchewan consume less fruits and vegetables as recommended by Canada' Food Guide. Low intake of fruits and vegetables among Saskatchewan seniors may be due to poor oral health.[17]

Some systemic diseases deteriorate oral hygiene and result in worsening of oral health status

Various systemic diseases have a profound effect on periodontal tissues such as blood dyscrasias, neutropenia, osteoporosis, immunodeficiency diseases, pregnancy, renal dysfunction, and diabetes. In addition, some medical conditions made it difficult for older individuals to take care of their oral hygiene and thus compound oral health problems. [57]

Osteoporosis.

Osteoporosis is considered a risk factor for alveolar bone loss, a characteristic of severe periodontal disease. Smoking, diet, and genetic factors are identified as risk factors for both osteoporosis as well as periodontal disease. Similarly, hormone replacement therapy and bisphosphonates treatments have been found effective against both postmenopausal osteoporosis and severe periodontitis. [58]

Systemic loss of bone density in osteoporosis may lead to increased periodontal tissue destruction. Authors of a study examined the relationship between systemic bone mineral density and periodontal disease among older individuals aged 70 years and found significant relationship between periodontal disease and systemic bone mineral density. [141]

Immunodeficiency and periodontal health.

Progression of periodontal disease is more prominent in HIV infected patients who have oral problems such as hairy leukoplakia, malignancy, drug induced givgival enlargement and

periodontal disease as a result of immunosuppression.[57] A literature review reported that oral diseases were common in almost all the individuals infected with HIV. [59]

Depression.

Depression is a mental disorder in which mood, thoughts, and behavioural patterns are adversely affected.[142] The prevalence of depression in Canada ranges from 1.2% to 11.2% among older individuals living in the community and is more common among the elderly living in nursing homes.[143] Depression is a major public health problem which impairs skills such as bathing, dressing, and hygiene. Individuals with depression are generally disinterested in performing their oral hygiene and frequently have reduced salivary flow, rampant dental caries, oral dysesthesias and severe periodontal disease. [60] People with high severe depression have nearly three times more periodontal disease than normal individuals.[57] Even the medications used to treat depression increase xerostomia (dry mouth) which complicates the already compromised oral health among patients with depression. [144]

Dementia.

Dementia is a loss of intelligence, memory and cognitive functions that interferes with daily activities including performing daily oral hygiene. Advanced age is a major risk factor for dementia, and Alzheimer's disease is the most common cause of dementia. [144,145] Prevalence of dementia was reported to be as high as 67.4% on admission to nursing homes and as high as 72% later, and was slightly higher in women than men.[61] Institutionalized older individuals with

dementia have poor oral health and severity of oral diseases is associated with the severity of physical and cognitive impairment associated with dementia.[62]

Rheumatoid Arthritis.

Rheumatoid arthritis (RA) patients have a higher prevalence of periodontal disease. For example, individuals with RA have 8.05 fold increase odds of periodontitis compared to individuals without RA.[63] Due to common pathological mechanisms such as chronic inflammation, there is a strong association between RA and periodontal disease.[146] RA and periodontal disease have elevated systemic inflammatory mediators, increased levels of oral anaerobic bacterial antibodies have been identified in the serum and synovial fluid of patients with rheumatoid arthritis.[147] Regardless of medications used to treat RA, non surgical periodontal treatment lowers the signs and symptoms of RA. [148]

Parkinson's disease.

Patients with Parkinson's disease have more dental decay, few natural teeth and increased incidence of periodontal disease.[149] They also have impaired orofacial functions, poor mastication and restricted jaw opening.[150] A case control study has reported that patients with Parkinson's disease have more chewing difficulties and denture discomfort compared to controls and more than half of Parkinson's disease patients suffered swallowing difficulties.[151]

Poly-pharmacy/over medication.

In Saskatchewan, older adults account for 46.4% of total prescriptions dispensed in 2003/2004, and this trend of multiple medications increases with the age. For example, elderly individuals 65 to 74 years received 22.6 prescriptions, individuals 75 to 84 years filled 29.4 prescriptions, and 85 year and older individuals received 35.2 prescriptions in 2003/2004.[17] The eelderly may take multiple medications to control one or more chronic diseases. Side effects, allergic reactions, and pharmacological actions of drugs produce dry mouth, candidiasis, ulcerations, erythema multiform, gingival hyperplasia. [64] It has been reported that almost 30% of dentate patients medicated with cyclosporine exhibited significant gingival enlargement. [57] Asthmatic patients taking medications such as bronchodilators, cortisteriods may be at risk of dental decay, periodontal disease and oral candidiasis. [65] Similarly many patients with multiple sclerosis take long term medication such as steroids and diuretics which can cause dryness of mouth, and difficulty in eating, talking and denture wearing.

Financial Impact of poorer oral health

As mentioned above dental and oral diseases are associated with heart diseases, diabetes, aspiration pneumonia, arthritis, and other systemic diseases. Therefore poor oral health could be a substantial source of morbidity and mortality particularly due to high prevalence of cardiovascular diseases. [66] Several studies have shown a relationship between oral health and total mortality. [41]

In Saskatchewan, older adults accounted for one third or 37.4% of hospitalization in 2002/2003 and the top five diseases for hospitalizations included cardiovascular disease, injuries, cancers, neumonia, and arthritis. [17] We can lower the cost and burden of oral disease to our health system by providing comprehensive oral health programs which would reduce the prevalence of oral disorders and improve general health and quality of life and would also decrease the complications resulting systemic diseases and their associated emergency and hospital costs.[21] Various studies indicate that fewer health care dollar expenditures are required if good oral health care is maintained. [35]

According to a 2002 analysis done in the United States, it was found that if 19,000 nursing homes employed an “oral care specialist” such as dental assistant, with an average salary of $25,000 per years plus benefits, and if a 10% incidence of pneumonia among older adults is reduced due to the improvement in the oral health brought by oral care specialist, there would be net cost saving of more than $300million.[67]

A comprehensive economic analysis done in 2005-06 estimated that by providing oral care to older Australians aged 65 and over, $412 million expenditure on systemic complications of poor

oral health can substantially be reduced. It is important to note the analysis only included coronary heart disease, stroke, peripheral vascular disease, and pancreatic cancer, and other diseases such as aspiration pneumonia and rheumatoid arthritis etc were not incorporated in the analysis.[68]
Based on the data available from the pilot project in Saskatchewan, it is estimated that non availability of oral care to the residents of long term care facilities in Saskatchewan would an expenditure of $1,436,140 due to medical conditions resulting from oral diseases. [17] Similarly, Saskatchewan would bear a cost of $20 million ($20,096,083) incurred to our health care system due to these major systemic complications resulting from oral diseases. It is also estimated that in an ideal situation where 54% of seniors with oral disease in the province are treated under publicly funded dental coverage, there would be a net saving of $ 4 million.

Total cost of dental diseases which include direct dental costs and indirect costs due to systemic diseases resulting from poor oral health is assessed to be $ 36.5 million in Saskatchewan. A figure of $36.5 million clearly reflects that Saskatchewan is facing a silent epidemic of senior's oral health. In the absence of comprehensive oral health program for our older adults, the current dental expenditures are likely to increase and would cost Saskatchewan more health care dollars and would further strain the health care system in the future.

There is dire need to make policies to avoid the escalating direct and indirect dental expenditures for Saskatchewan's fastest growing population. A comprehensive oral health program, which must include preventive measures, oral health promotion, and management of oral disease, would result in huge net cost savings in the province. We must focus on providing a comprehensive oral care program not only to the residents of long term care facilities but also to the home bound seniors and other community older adults who have problem accessing oral health care. If

preventive measures including oral health education and basic dental care are not provided to these seniors, it would result in more seniors entering long term care facilities with more complicated oral diseases and their associated systemic complications, more hospital and emergency expenditure. We have to make policies to provide cost effective comprehensive oral care to our seniors which must include provision of dental treatment, preventive measures and oral health promotion.

Position Statement of Canadian Dental Association on Oral Health Care for the Residents in Long-Term Care Facilities.

According to the position statement of the Canadian Dental Association,

- Upon admission to long term care facility, the resident should undergo oral health screening performed by a nurse as a part of routine collection of health information for minimum data set. Oral health screening should also be used to determine the type oral care and level of assistance required by the resident to maintain satisfactory oral health.
- Proper arrangements for the provision of emergent or urgent dental services should be available to the residents, if they are diagnosed with oral/dental pain, swelling, or facial trauma.
- The arrangements should be made for the provision of dental examination and definitive treatment, and all the residents should be examined by a dentist within 6 weeks of admission to long term care facility.
- Health care staff should monitor daily mouth care of all the residents on regular basis.
- Residents who can effective clean their own teeth should be supplied with tooth brushes, and fluoride containing tooth pastes, and resident with dentures should be provided with a container for the storage of denture and a brush for denture cleaning.
- All dentures should be labelled / identified with resident's name.

- For the residents who require assistance in maintaining their oral hygiene, a support worker, care aide or nurse should provide appropriate assistance for the cleaning of teeth, mouth and dentures twice a day preferably after each meal.
- A nurse should perform oral health screening of all the residents of long term care facilities every 3 month to update minimum data set, and to identify new dental problems, and assess the level of assistance required by residents.
- All the long term care facilities should have suitable facilities for the delivery of initial oral examination, and ongoing needed dental care.
- The cost of dental services provided by dental professional which include dental examinations, and re-evaluation should be paid by the provincial health care plan or another appropriate plan. The costs of essential dental care, whether provided in the facility, a hospital or a community dental clinic, should be covered for all the residents of long term care facilities.

Senior's oral health programs and services in Canadian provinces.

Alberta. Oral health care is not included in Nursing homes Operation Regulation Act in Alberta. There are no protocols or standardized oral health assessment in the long term care facilities in the province.[152] However, the Alberta government provides the Dental Assistance for Seniors program to low -to moderate- income seniors with financial assistance. The Dental Assistance for

Seniors program can provide dental coverage up to a maximum of $5,000 every five years and include basic dental procedures such as examinations, x-rays, scaling polishing, fillings, trauma, pain control, extractions, root canals, partial and full dentures.[153]

British Columbia. The British Columbia government recognized the significance of oral health and made amendments (1997) in the "Adult Care Regulation" which governs licensed long term care facilities in the province. According to this regulation, licensed long term care facilities are required to provide certain oral health services to the residents of long term care facilities. This regulation affect all licensed long term care facilities including group homes. Adult Care Regulation resulted in increased awareness and obligation among some administrators who helped in developing and implementing oral care polices for residents of long term care facilities. Under the regulation, supervision clause for dental hygienists was removed which resulted in their enhanced role in providing care to the residents. Dentists are encouraged to provide dental treatment in long term care facilities by providing some incentive, and fee guide also takes in to consideration of more time spent in providing oral care to residents. Some health regions have oral health programs which include oral health assessment, dental treatment, oral health promotion and preventive services.

University of British Columbia Geriatric Dentistry Program[154] is one of the most prominent oral care programs available to residential care population in BC. This program started in 2002 as a joint venture between the Providence Health Care and the University of British Columbia (UBC) Faculty of Dentistry. In 2003, the program was expanded to include additional facilities in the Vancouver coastal Health Authority, and now provides oral health assessments, and dental

treatment (by dentist, dental hygienist, or dental specialist) to almost 2500 clients from 22 long term care facilities. The program also includes an education and research component. Oral examinations and basic dental care are provided at the bedside using mobile dental equipment, while complex treatment is provided at UBC dental clinic, or at clinic within the hospitals.

Manitoba. There are no standard oral health assessment protocols or guidelines governing the oral care of residents in long term care facilities in Manitoba. However, the Faculty of Dentistry, University of Manitoba is playing a significant role in improving the oral health of residents through the Centre for Community Oral Health program(CCOH).[153],[155] CCOH is a non profit program established in 2000, which provides oral health services to various groups of community who are unable to access private dental services. The program includes clinical and health promotion component and provides training, educational and research opportunities for dental students as well.

CCOH runs various dental programs such as Dear Lodge Centre, Access Down Town Dental Clinic, Home Dental Care Program, and the Oral Health Promotion Unit. Dear Lodge Centre, Manitoba is a 500 bed long term care and rehabilitation facility which has a large dental clinic. Oral health services are provided to the residents and staff of the facility and also to the individuals from surrounding community. Home Dental Care program is an outreach program which utilizes two dental mobile vans and provides services to personal care homes, seniors, hospital and private homes. The dental team comprises a dentist, dental hygienist and dental assistant. They provide the initial patient examination for free, however further treatment is provided on a fee for service

basis. The Oral Health Promotion Unit provides prevention focussed health promotion and visits over 40 long term care facilities in the Winnipeg and surrounding area.

Ontario. Ontario has taken initiatives to improve oral health of older individuals. For example a "Task Force on Community Dental Services" recommended guidelines such as screening, clinical preventive measures and dental health education for the older individuals and handicapped people in 1974. Similarly, in 1993, Long Term Care Facility Program Manual was released by the Ontario Ministry of Health which included standards for oral health care. However, oral health programs for seniors were reduced in 1997 when preventive dental public health services for seniors were no longer mandated.[153]

Halton, Ontario Oral health Outreach Program (HOHO).[156] (160)

This project is a multi-partner project and involves the coordination of dental services for individuals with special care needs and the frail elderly population. In 1999- 2000 various initiatives were taken which resulted in the development of partnerships between Health Department and Community Care Access Centres (CCAC) of Halton. CCAC maintains a data base of those dental professionals who are willing to provide services to the clients in their offices or other settings. CCAC case managers provide information and referral to oral health services and dental resources in the community. Oral health assessments and co-ordination of services are available in long term care homes, CCAC, hospitals and community nursing agencies. Oral health assessment is completed by CCAC case managers for the individuals entering a LTC facility or client living in the community who may require oral health services. Financial assistance is also provided to the qualifying individuals.

Toronto, Ontario Public Health[157] (161)

Toronto Public Health provides dental screening, professional cleaning and denture labelling to residents of the facility. Workshops are conducted for the caregivers and independent older adults on the importance of oral health and disease preventions. Screenings are arranged by the facilities, and not all the facilities provide these services to their residents. Dental hygienist conducts oral screening within the facilities and Toronto Public Health dentist visits the facility to provide examination to those residents who are identified with oral conditions. Free and low cost dental services are provided to the individual aged 65 and older at Toronto Public Health dental clinics. Basic dental services include examination, x-ray, fillings, cleaning, some root canals, extraction, however full or partial dentures are also covered but clients pay for laboratory costs.

Prince Edward Island. Prince Edward Island has a " Long -Term Care Facilities Program" which provides annual oral screening, followed by basic preventive services, and referral for needed dental treatment to all the residents of long term care facilities who are at a level of high care i.e., level 4 or 5. In addition to this, the province has also developed a Senior's Oral Health Strategy to address the oral health problems of seniors.[158]

The Long Term Care Facilities Program covers eighteen long term care facilities including Hillsborough Hospital which is a mental health facility. Oral screening is provided once a year by a dental public health dentist, assisted by dental hygienist who is a contact person for the facility who arranges the screening. A public health dental hygienist is assigned to each of LTC facilities, and she provides preventive services (scaling, application of fluoride varnish, labelling of denture), follow up with facility on referrals, charts, and staff education and training. After screening and

preventive services, a dental hygienist transfers the information to a computer, and data from the facilities is merged to a provincial data base. This program provided screening to 1060 clients in 2007 out which 62% received preventive services, 12.8% referral to dentist for examination and dental treatment and 12% were referred to physician to monitor or diagnose lesions.[159] The Seniors Oral Health Strategy includes a planning process to address legislative, financial, social and geographic issues regarding senior's oral health and to implement low income dental clinics for seniors who lack access to oral health services.[160] (159)

Conclusion

The age of seniors is increasing and so is the senior population and with it the associated multiple chronic diseases including oral diseases. Better dental treatment, fluoridation, and improved socioeconomic and education status have resulted in the retention of more natural teeth among older adults which also increased the risk of acquiring more dental diseases such as caries and periodontal diseases. Additionally, lack of oral health care infrastructure has further deteriorated the oral health problems among the elderly. Neglect of the oral health of seniors is related to many factors which include lack of awareness and recognition about the significance of oral health and its impact on systemic health at various levels of our community such as caregivers, policy makers, various health associations, organizations, institutions and governments. The lack of collaboration particularly among various disciplines of dentistry and a lack of collective advocacy, lobbying and

leadership role are also important reasons for not having oral health standards, protocols, oral health assessments, and mandatory oral examinations in long term care facilities and for other vulnerable groups of seniors. Limited research activity for seniors' oral health issues and inadequate availability of geriatric education and training are also complicating this looming public health crisis. It is extremely important to recognize the impact of poor oral health on systemic diseases, social and emotional problems and the bidirectional relationship between oral diseases and medical conditions. The financial burden due to oral diseases and the resulting cost of systemic diseases on our health care system. The review of best practices in Canada reveals that only a few health regions or even some long term care facilities are providing better oral health care services to residents of long term care facilities and seniors. In general most of the provinces in Canada lack standardized oral health guidelines or protocols and oral health programs that provide comprehensive coverage of underserved seniors and residents of LTC facilities. In some provinces, however, the College of Dentistry has played and are playing a remarkable role in improving the overall oral health of vulnerable groups of the community by promoting the oral health of older adults. Similarly, the College of Dentistry, University of Saskatchewan and some long term care facilities in Saskatoon and Regina have developed various models of oral care delivery to the long term care residents. But that is not enough, keeping in mind the magnitude of this crisis of seniors oral health (i.e., approximately 15% of our population's fastest growing segment, out of which about 30% have difficulty in accessing oral health services and almost 54% to 67% suffer from oral disease and need dental treatment).

There are various modes of delivery of oral health services which include dental services provided in the facilities or homes using portable dental equipment, mobile dental clinic vans,

multi-disciplinary or community based approach. Saskatchewan must maintain its history of equity and fairness, and develop a comprehensive oral health program using the most cost effective model of oral care delivery to cover the underserved older individuals across the province. Therefore, we must collaboratively lobby the policy makers and government to establish a comprehensive oral health care for the seniors of Saskatchewan who are already suffering from multiple diseases of great intensity and severity. We need to appreciate the paradigm of "social justice" and need to understand the sufferings and severity of oral diseases and associated systemic complications experienced by our older adults. Just like general health, oral health is a basic right of individuals but we are not fulfilling our ethical responsibilities in providing this basic right, especially to the most vulnerable groups of our community.

Recommendations

Collaboration, advocacy, and lobbying.

As mentioned earlier, older adults are at higher risk of oral diseases and poor oral health is linked to systemic problems such as stroke, diabetes, heart disease, respiratory infection and poor nutrition. The poorer oral health status of elderly, their complex treatment needs and oral-systemic link, call for the greater collaboration among dental associations, medical associations, various nursing associations, allied health associations, college of dentistry, school of public health and other associations and organizations for advocacy and lobbying the provincial and federal governments.

a. Lobby the provincial government to create a Provincial Chief Dental Officer. The creation of a Provincial Chief Dental Officer would strengthen collaboration among various dental associations as the Saskatchewan Dental Assistants Association (SDAA), the Saskatchewan Dental Hygienists Association (SDHA), the Saskatchewan Dental Therapists Association (SDTA), and the Saskatchewan Denturists Society (SDS). The resolution of regulatory, scope of practice and other issues faced by these associations would enable the development and implementation of comprehensive oral health policies in Saskatchewan. The office would establish collaboration with other organizations and institutions, and would also facilitate research on oral health problems, to prevent oral diseases and promote oral health in the province.

b. Lobby provincial government and health regions to create a dental public health department unique to Saskatchewan using a multidisciplinary model of oral health care. The oral health of the elderly and other vulnerable groups is a major public health problem. In the absence of a proper dental public health department and appropriate model of care, the public and government will face bigger challenges in terms of suffering and financial losses. The creation of a dental public health department must focus on the current and future oral needs of the province. In Saskatchewan, a multidisciplinary model of comprehensive oral care is important and should include dental therapists because Saskatchewan is unique that it has the highest number of dental therapists in Canada. The multidisciplinary team could be comprised of a dental assistant, dental technician, denturist, dental therapist, dental hygienist, dentist, and medical and allied health professionals. Saskatchewan's multidisciplinary model of comprehensive oral care must allow greater opportunities for every caregiver, particularly dental care personnel, to provide the maximum service for the best interest of the community.

c. Lobby federal and provincial governments to include oral care of elderly and other vulnerable groups to be covered in the same way general health care is covered, because oral health is necessary for general health. Just as general health is a basic right of Canadians, so is oral health. Saskatchewan is the birth place of the Canadian health care system, Medicare. It is time for the province to take a leadership role once again and become a leader in Canada by introducing comprehensive oral

health care systems for vulnerable groups, especially the elderly, which will represent more than 20 percent of the provincial population in future years.

d. Advocating and lobbing policy makers and Government to include Canadian Dental Association's (CDA) recommendations outlined in the CDA's position statement on oral health care for the residents in long-term care facilities.

e. Advocating and lobbing policy makers and Government to make regulations for a mandatory oral examination upon entrance of older adults in to long term care facilities and annual oral examinations of all the residents of long term care facilities, home bound seniors and older adults who have poor access to oral care. Regulations must be made to provide space in the long term care facilities for provision of dental treatment, procedures, oral screening and examinations. This space may be utilized by other health professions.

f. Lobby governments, health regions, Aging institute, and Canadian Institute of Health Research, to provide funding for research in to geriatric oral health.

g. Lobby government and health regions to provide funding for a mobile dental clinic van/bus, dental supplies and denture labelling.

h. Lobby government and health regions to develop strategies for the oral health promotion and prevention of oral diseases using a common risk approach. The common risk approach involves reducing risk factors such as smoking, alcohol, stress which are common to chronic disease such as cardiovascular disease, diabetes mellitus, cancers and oral disease.

i. Lobby government and health regions to provide incentives for geriatric health care workers, especially dental caregivers to overcome the shortage and mal-distributions. Develop a fee guide specific to geriatric dental services.

j. Collaboration among the College of Dentistry, School of Public Health and Health Regions and associations for the awareness and recognition that oral health is intrinsic to general health. Awareness and recognition about the significance of oral diseases and their impact on systemic conditions for older adults (residents), family members, administrators of long term care facilities, nursing staff, officials in health regions and the Ministry of Health can be achieved by establishing strong collaborations among the School of Public health, College of Dentistry, other dental associations and health regions. Professional students from the School of Public Health, many with an international background, can be an excellent resource for oral health promotion and for leadership roles for advocacy, policy development, management and research activities.

k. Collaboration among various disciplines of dentistry and other health associations to develop oral health standards, protocols, oral screening programs, oral health assessment and examination, oral health information for minimum data set informed consent, and oral health promotion and prevention programs.

More research.

a. Research in to oral health needs of older individuals, their preferences, attitudes and beliefs towards oral care.

b. Research into the issues faced by patients, caregivers, administrators, and health regions.

c. Research in to data collection about different oral diseases among older adults and their association with systemic diseases.

d. Research in to assessing the financial burden due to poor oral health status among geriatric individuals.

e. Research in to the evaluation of impact of nursing home regulation, oral health assessment and examination programs, and oral health standards and protocol.

f. Research in to assessing the most effective training program for nursing staff, and other caregivers regarding oral needs of elderly.

g. Research in to evaluating the most cost effective and best model of delivery of oral health program.

Education and training of dental professionals and other health care givers.

a. Geriatric dental courses must be included in curriculum of various programs of dentistry, medicine, nursing and allied health professions.

b. Training programs for geriatric oral health must be offered to the health care givers particularly nursing assistants, and other nursing staff.

c. Geriatric oral care residency programs should be available to dental and medical graduates.

d. Provision of continuing education and training to those health care givers who want to acquire skills and expertise in geriatric oral health.

Appendixes

Appendix A: Position Statement of Canadian Dental Association on Oral Health Care for the Residents in Long-Term Care Facilities.

CDA Position on

Oral Health Care for Residents in Long-Term Care Facilities

Preamble

Staff of long-term care facilities, dentists and other oral health care providers should work cooperatively, individually and collectively to develop constructive relationships and processes to advocate for and to enable the provision of appropriate care for the oral health needs of the residents.

The Problem

Oral health is generally poor among residents of long-term care facilities. This situation results from a combination of inadequate daily mouth care, limited access to professional dental care, inadequate facilities for the provision of dental treatment, compromised medical condition, and limited finances.

Objective

To improve the oral health of residents of long-term care facilities by ensuring minimum standards of oral health care.

Detailed Explanation

All residents of long-term care facilities should undergo oral health screening on admission by a nurse as part of the routine collection of health information for the minimum data set (see note). For those residents in whom dental problems are identified (pain, facial swelling of suspected dental origin, or recent facial trauma), appropriate arrangements should be made to attend to the resident's immediate comfort. Following the appropriate emergent or urgent dental care, arrangements should then be made for a dental examination and definitive treatment. All residents should be examined by a dentist within 6 weeks of admission.

The oral health screening should also be used to determine the type of daily mouth care needed and the level of assistance required to achieve that care. Care staff should monitor all residents' daily mouth care on a regular basis. Residents who can effectively clean their own teeth should be provided with a toothbrush and fluoride-containing toothpaste. Those with removable dentures should be given a container for dry storage of the denture when they are sleeping and an appropriate brush for cleaning the denture. All dentures, both partial and complete, should be labeled with the resident's name. Those requiring assistance with daily mouth care should

This information was created by the Canadian Dental Association for use by CDA member dentists. It should not be used as a replacement for professional dental or medical advice. If you have questions about this position statement, please consult your dentist or contact the Canadian Dental Association.

receive appropriate assistance from a personal support worker, care aide or nurse for cleaning the teeth, mouth and dentures at least twice daily, but preferably after each meal.

In addition, all residents of long-term care facilities should undergo oral health screening by a nurse every 3 months to update the minimum data set. Residents who are no longer able to perform their own daily mouth care should receive assistance thereafter. Those in whom new dental problems are identified either at or between screenings should be seen by a dentist within a reasonable length of time, depending upon their condition, as outlined above.

To facilitate the delivery of the initial oral health examination and ongoing oral health care, all long-term care facilities should be required to have suitable facilities, to support the appropriate delivery of needed dental care.

For residents of long-term care facilities who require dental examinations and re-evaluation by a dental professional, the cost of services should be paid by the provincial health care plan or another appropriate plan. The costs of essential dental care should be covered for all residents of long-term care facilities, regardless of whether the services are delivered in the facility, a hospital or at a community dental office.

Note: Minimum Data Set (MDS) refers to the 'Resident Assessment Instrument Minimum Data Set' that is widely used internationally in LTC settings and is mandatory in a number of Canadian provinces. It contains an oral health/dental assessment section.

CDA Board of Directors
Approved: June 2010

This information was created by the Canadian Dental Association for use by CDA member dentists. It should not be used as a replacement for professional dental or medical advice. If you have questions about this position statement, please consult your dentist or contact the Canadian Dental Association.

Appendix B: Dental Services Comparison by Province

Province	Regulation	Program	Caregivers	Coverage	Services
Alberta		"Dental Assistance for Seniors programs" up to maximum of $ 5,000 every five years . Dental Clinic and Dental Outreach Program, Calgary Health Region.(153) Glenrose Seniors Dental Clinic. (153) Lakeland Regional Health Authority. (153)	Dentist. Dental Hygienist.	Low to moderate income seniors. 21 Care facilities in Calgary Health Region. 4,700 treated annually in 10 long term care facilities.	1.Basic dental procedures such as examinations, x-rays, scaling polishing, fillings, trauma, pain control, extractions, root canals, partial and full dentures. 2.Oral Health assessment. 3.Mouth care education to staff. 4.Fee for services dental treatment.
British Columbia	According to "Adult Care Regulation" requires the provision of certain oral health services to the residents of long term care facilities.	University of British Columbia Geriatric Dentistry Program.	Dentist Dental hygienist can work without dentist's supervision. dental specialist	Approximately 2500 clients From 22 long term care facilities.	1. Oral health assessment 2. Dental examination 3.Dental treatment. 4.Oral health promotion

		Queen's Park Care Centre Oral health program (153) The BC Northern Interior Health Unit Geriatric Outreach Dental program (153).			and preventive services. 5.Research opportunities for students.
Manitoba		Faculty of Dentistry, University of Manitoba's Centre for Community Oral Health program(CCOH). CCOH a.Dear Lodge Centre b.Access Down Town Dental Clinic c.Home dental care program (Mobile Dental Vans)	Dentist Dental hygienist	1200 individuals receive dental services per year. (153) four-chair clinic provide community services to underserved communities in Winnipeg. Approximately 3, 000 residents receive dental services annually.(153)	1.initial patient examination for free 2.Clinical Treatment fee for services. 2.Health promotion (prevention, training and educational) 4.research opportunities for dental students.

		d.Oral health promotion unit.		Over 40 long term care facilities in the Winnipeg and surrounding area.	
Ontario	Long term care Facility Program Manual included standards of oral care.	Halton Oral health Outreach Program (HOHO).	Dental hygienist is case manager who conducts oral health assessment. Dental assistant is community educator. Private dentists.	long term care homes, Community Care Access Centres (CCAC), hospitals, community nursing agencies, and clients living in the community in the Health Region.	1. Oral health assessments 2.Co-ordination of oral health services
		Toronto Public Health Dental services.	Dental hygienist conducts oral screening. Toronto Public Health dentist provides treatment.	1.Most of long term care facilities.	1.Oral screening 2.Denture labelling 3.Professional cleaning 4.Free and low cost dental treatment.
				2.Individuals aged 65 year and older in the Health Region receive free and low cost dental treatment.	Free and low cost dental treatment include examination, x-ray, fillings, cleaning, some root canals,

					extraction, however full or partial dentures.
Prince Edwards Island		1.Long -Term Care Facilities Program. 2.Senior's Oral Health Strategy	Public health Dentist conducts oral screening. Public health Dental Hygienist.	All the residents of 18 long term care facilities who are at a level of high care i.e., level 4 or 5 and Hillsborough Hospital (mental health facility). Senior's Oral Health Strategy would address the oral health problems of seniors.	Annual oral screening. Basic preventive services. Referral for needed dental treatment.
Saskatchewan	Personal Care Homes Regulation.	1.Only three dental clinics within the long term care facilities in Saskatchewan and out of which one (Regina) is operational. 2.College of Dentistry University of Saskatchewan is in the process	Dentist. Dental hygienist.		Dental treatment.

		of establishing programs in two LTC facilities in Saskatoon.			

References

[1] Health Promotion Glossary. World Health Organization. http://www.who.int/hpr/NPH/docs/hp_glossary_en.pdf

[2] The objectives of the WHO Global Oral Health Programme.http://www.who.int/oral_health/objectives/en/index.html

[3] U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. Rockville, MD: USDHHS, NIDCR, NIH, 2000.

[4] Poul Holm-Pedersen, Merete Vigild, Ina Nitschke, Douglas B. Berkey. Dental Care for Aging Populations in Denmark, Sweden, Norway, United Kingdom, and Germany. Journal of Dental Education ■ Volume 69, Number 9.

[5] Wayne J. Millar and David Locker. EDENTULISM AND DENTURE USE. http://www.statcan.gc.ca/studies-etudes/82-003/archive/2005/8711

[6] Improving Oral Health Services for Saskatchewan People. A Brief Prepared by the College of Dental Surgeons of Saskatchewan. September 2007. http://www.sdaa.sk.ca/publications/CDSS%20Brief%20Sept%202007.pdf

[7] Dougall A, Fiske J. Access to special care dentistry, part 4. Education. Br Dent J. 2008 Aug 9;205(3):119-30.

[8] Kenneth Shay. Infectious Complications of Dental and Periodontal Diseases in the Elderly Population. Clin Infect Dis. (2002) 34 (9): 1215-1223.

[9] Poul Erik Petersen and Tatsuo Yamamoto. Improving the oral health of older people: the approach of the WHO Global Oral Health Programme. Community Dent Oral Epidemiol 2005; 33: 81–92.

[10] Linda S. Orgain, Maggie Moore, William F. Benson. CDC Aims to Prevent Oral Diseases Among Older Americans. http://www.chronicdisease.org/nacdd-initiatives/healthy-aging/meeting-records/HA_CIB_OralHealth.pdf.

[11] Mary McNally. Oral Health Matters: What Will it Take to Leave No Senior Behind? © J Can Dent Assoc 2005;

[12] Ronald L. Ettinger. Rational Dental Care: Part 1. Has the Concept Changed in 20 Years? J Can Dent Assoc 2006; 72(5):441–5.

[13] Melladee F. Marvin Access to Care For Seniors — Dental Concerns. J Can Dent Assoc 2001; 67(9):504-6.

[14] David W. Matear, John Barbaro. Oral Health Services in Nursing Homes? A Survey of Nursing Homes in Simcoe County, Ontario. Middle East Journal of Age and Aging: October 2008, Volume 5 - Issue 5.

[15] Michael I. MacEntee. Missing Links in Oral Health Care for Frail Elderly People. J Can Dent Assoc 2006;

[16] Treadwell, Henrie M. Northridge, Mary E. Oral Health is the Measure of a Just Society. Journal of Health Care for the Poor and Underserved, Volume 18, Number 1, Feb. 2007, pp. 12-20.

[17] A Health Profile of Saskatchewan Seniors 1992-2003. Population Health Branch & Community Care Branch Saskatchewan Health Regina, Saskatchewan. http://www.health.gov.sk.ca/hlth-profile-sk-seniors.

[18] Chen,M., Harmon, P. and Andersen, R. Oral Quality of life. Comparing oral health care systems. http://whqlibdoc.who.int/hq/1997/WHO_ORH_ICSII_97.1_(chp10-chp13).pdf .

[19]Elisa M. Gheui, Jonathan A. Ship. Systemic Diseases and Their Treatments in the Elderly: Impact on Oral Health. J Public Health Dent 2000;60(4):289-96.

[20] N. Karl Haden, Ph.D.; Frank A. Catalanotto et al. Improving the Oral Health Status of All Americans: Roles and Responsibilities of Academic Dental Institutions The Report of the ADEA President's Commission.Journal of Dental Education.2003. Volume 67, Number 5, 562/583.

[21] Salme E. Lavigne. The State of Oral Health in Personal Care Homes: A Public Health Issue? JCDA. December 2008/January 2009, Vol. 74, No. 10.

[22] McNally, Mary. Rights access and justice in oral health care: justice toward underserved patient populations--the elderly. The Journal of the American College of Dentists. 70 (4): Fall 56-60; 2003.

[23] Ira B. Lamster. Oral Health Care Services for Older Adults: A Looming Crisis. Am J Public Health. 2004 May; 94(5): 699–702.

[24] Robert J. Hawkins , Patricia A. Main, David Locker. Oral health status and treatment needs of Canadian adults aged 85 years and over. Special Care in Dentistry; Volume 18, Issue 4, pages 164–169, July 1998.

[25]Ronald L. Ettinger. The Development of Geriatric Dental Education Programs in Canada : An Update. J Can Dent Assoc 2010;76:a1.

[26] BF Gooch, PI Eke. Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report. Public Health and Aging: Retention of Natural Teeth Among Older Adults—United States, 2002. JAMA. 2004;291(3):292-293.

[27] David Locker and David Matear. Oral disorders, systemic health, wellbeing and the quality of life. http://www.utoronto.ca/dentistry/facultyresearch/dri/cdhsru/health_measurement/7.%20%20No%2017.pdf

[28] Oral Healthcare and the Frail Elder: A Clinical Perspective. By Michael I. MacEntee, Frauke Miller, Chris Wyatt. First Edition 2011.

[29]Shah N. Need for gerodontology education in India. Gerodontology. 2005 Jun;22(2):104-5.

[30] Teresa A. Dolan, Kathryn Atchison,Tri N. Huynh. Access to Dental Care Among Older Adults in the United States. Journal of Dental Education ■ Volume 69, Number 9.

[31] Patricia Coleman. Collaboration of Nursing and Dentistry. Geriatric Oral health The missing link to comprehensive care. http://www.geriatricoralhealth.org/topics/topic07/default.aspx.

[32] Peter Davis and Philippa Howden-Chapman. Translating research findings into health policy. Social Science & Medicine Volume 43, Issue 5, September 1996, Pages 865-872.

[33] James L. Leake. The History of Dental Programs for Older Adults. J Can Dent Assoc 2000;66:316-9

[34] Gonsalves WC, Wrightson AS, Henry RG. Common oral conditions in older persons. Am Fam Physician. 2008 Oct 1;78(7):845-52.

[35] Mary S. Haumschild, Ryan J. Haumschild. Clinical Practice in Long-Term Care The Importance of Oral Health in Long-Term Care. Journal of the American Medical Directors Association Volume 10, Issue 9, November 2009, Pages 667-671

[36] J.M. Chalmers and R.L. Ettinger. Public Health Issues in Geriatric Dentistry in the United States. Dental Clinics of North America. Dental Public Health Volume 52, Issue 2, April 2008, Pages 423-446.

[37] Poul Erik Petersen and Tatsuo Yamamoto. Improving the oral health of older people: the approach of the WHO Global Oral Health Programme. Community Dent Oral Epidemiol 2005; 33: 81–92.

[38] Kaumudi J. Joshipura, Hsin-Chia Hung, Eric B. Rimm, Walter C. Willett, Alberto Ascherio. Periodontal Disease, Tooth Loss, and Incidence of Ischemic Stroke. Stroke. 2003;34:47-52.

[39] Brian Hutton, Jocelyne Feine, José Morais. Is There an Association Between Edentulism and Nutritional State?J Can Dent Assoc 2002; 68(3):182-7.

[40] Armin J. Grau and Heiko Becher et al. Periodontal Disease as a Risk Factor for Ischemic Stroke. Stroke. 2004; 35: 496-501.

[41] Linda L. Humphrey, Rongwei Fu, David I. Buckley, Michele Freeman, and Mark Helfand. Periodontal Disease and Coronary Heart Disease Incidence: A Systematic Review and Meta-analysis. J Gen Intern Med. 2008 December; 23(12): 2079–2086.

[42] Elena Paillaud, Isabelle Merlier, Catherine Dupeyron, Elisabeth Scherman, Joël Poupon and Phuong-Nhi Bories. Oral candidiasis and nutritional deficiencies in elderly hospitalised patients. British Journal of Nutrition (2004), 92: 861-867.

[43] K. Hatakka, A.J. Ahola1, H. Yli-Knuuttila, M. Richardson, T. Poussa, J.H. Meurman, R. Korpela. Probiotics Reduce the Prevalence of Oral Candida in the Elderly—a Randomized Controlled Trial. JDR February 2007 vol. 86 no. 2 125-130.

[44] Clemencia M. Vargas, Ellen A. Kramarow, Janet A. Yellowitz.The Oral Health of Older Americans. CENTERS FOR DISEASE CONTROL AND PREVENTION National Center for Health Statistics. 2001. http://www.mizar5.com/03oral.pdf.

[45] Oral cancer foundation. Oral Cancer fact: http://oralcancerfoundation.org/facts/index.htm.

[46] MI MacEntee, N Glick, E Stola. Age, gender, dentures and oral mucosal disorders. Oral Diseases. Volume 4, Issue 1, pages 32–36, March 1998

[47] G.D. Sladel, A.J. Spencer2, D. Locker', R.J. Hunt', R.P. Strauss', and J.D. Beck'. Variations in the Social Impact of Oral Conditions Among Older Adults in South Australia, Ontario, and North Carolina. J Dent Res 75(7): 1439-1450, July, 1996.

[48]K.J. Joshipura, E.B. Rimm, C.W. Douglass, D. Trichopoulos, A. Ascherio and W.C. Willett. Poor Oral Health and Coronary Heart Disease. J DENT RES 1996 75: 1631

[49] Helena Gail Rubinstein. Access to Oral Health Care for Elders: Mere Words or Action? J Dent Educ. 2005 69: 1051-1057.

[50] Sara A. Quandt, Margaret R. Savoca, at el. Dry Mouth and Dietary Quality in Older Adults in North Carolina. J Am Geriatr Soc. 2011;59(3):439-445.

[51] Christen Guffey Page, Kristin Anne King, and Richard Dressler. Decreasing Dehydration for Residents in Nursing Homes. Advance April 5, 2011 Vol. 21 • Issue 6 • Page 10

[52] Takeyoshi Yoneyama, Mitsuyoshi Yoshida, et al . Oral Care Reduces Pneumonia in Older Patients in Nursing Homes. J Am Geriatr Soc 50:430–433, 2002.

---

[53] Sara G. Grossi and Robert J. Genco. Periodontal Disease and Diabetes Mellitus: A Two-Way Relationship. Annals of Periodontology July 1998, Vol. 3, No. 1, Pages 51-61.

[54] Roberta Santos Tunes, Maria Cristina Foss-Freitas, Getulio da Rocha Nogueira-Filho. Impact of Periodontitis on the Diabetes-Related Inflammatory Status. J Can Dent Assoc 2010;76:a35.

[55] Mealey BL, Rose LF. Diabetes mellitus and inflammatory periodontal diseases. Curr Opin Endocrinol Diabetes Obes. 2008 Apr;15(2):135-41.

[56] Cyril 0 Enwonwu. Interface of malnutrition and periodontal diseases. Am J Clin Nutr February 1995 vol. 61 no. 2 430S-436S.

[57] RAUL I. GARCIA,MICHELLEM. HENSHAW & ELIZABETH A. KRALL. Relationship between periodontal disease and systemic health. Periodontology. 2000, Vol. 25, 2001, 21–36.

[58] Gera I. Osteoporosis: a risk factor for periodontal disease (literature review)]. Fogorv Sz. 2002 Apr;95(2):49-54

[59] Mary Weinert, Richard M. Grimes, Denis P. Lynch. Oral Manifestations of HIV Infection. Annals of Internal Medicine. September 15, 1996 vol. 125 no. 6 485-496.

[60]Friedlander AH, Friedlander IK, Gallas M, Velasco E. Late-life depression: its oral health significance. Int Dent J. 2003 Feb;53(1):41-50.

[61] Cosme Alvarado-Esquivel et al. Prevalence of dementia and Alzheimer's disease in elders of nursing homes and a senior center of Durango City, Mexico. BMC Psychiatry. 2004; 4: 3. Published online 2004 February 18. doi: 10.1186/1471-244X-4-3.
[62] Philcy Philip, Clive Rogers, Estie Kruger, Marc Tennant. Oral hygiene care status of elderly with dementia and in residential aged care facilities. Gerodontology 2011; doi: 10.1111/j.1741-2358.2011.00472.x.

[63] N. Pischon, T. Pischon, J. Kröger, E. Gülmez, B.-M. Kleber, J.-P. Bernimoulin, H. Landau, P.-G. Brinkmann, P. Schlattmann, J. Zernicke, F. Buttgereit, and J. Detert . Association Among Rheumatoid Arthritis, Oral Hygiene, and Periodontitis. Journal of Periodontology. June 2008, Vol. 79, No. 6, Pages 979-986

[64] Felder RS, Millar SB, Henry RH. Oral manifestations of drug therapy. Spec Care Dentist. 1988 May-Jun;8(3):119-24

[65] Thomas MS, Parolia A, Kundabala M, Vikram M. Asthma and oral health: a review. Aust Dent J. 2010 Jun;55(2):128-33.

[66] Lorelei A. Mucci, Chung-cheng Hsieh, Paige L. Williams, Manish Arora, Hans-Olov Adami, Ulf de Faire, Chester W. Douglass, and Nancy L. Pedersen. Do Genetic Factors Explain the Association Between Poor Oral Health and Cardiovascular Disease? A Prospective Study Among Swedish Twins. American Journal of Epidemiology. Vol. 170, No. 5 DOI: 10.1093/aje/kwp177.

[67]Pamela S. Stein, DMD, and Robert G. Henry, DMD, MPH. POOR ORAL HYGIENE IN LONG-TERM CARE. AJN June 2009. Vol. 109, No. 6.

[68] Australian Dental Industry Association. ECONOMIC ANALYSIS OF DENTAL HEALTH FOR OLDER AUSTRALIANS FINAL REPORT. September 2007. http://cotaover50s.org.au/e107_files/COTA_documents/publications/reports/economic_analysis_dental_health.pdf

[69] Robert J. Hawkins , Patricia A. Main, David Locker.˙ Oral health status and treatment needs of Canadian adults aged 85 years and over. Special Care in Dentistry; Volume 18, Issue 4, pages 164–169, July 1998.

[70] Locker D. The burden of oral disorders in a population of older adults. Community Dent Health. 1992 Jun;9(2):109-24

[71] Patricia Coleman. Improving Oral Health Care FOR THE FRAIL ELDERLY: A Review of Widespread Problems AND Best Practices. July • August 2002 Geriatr Nurs 2002;23:189-97)

[72] Douglas B. Berkey, MS;, Robert G. Berg, Ronald L. Ettinger, Lawrence H. Meskin. Research review of oral health status and service use among institutionalized older adults in the United States and Canada. Article first published online: 12 MAR 2008 DOI: 10.1111/j.1754-4505.1991.tb01521.x

[73] Vivien Lee. GERIATRIC DENTISTRY: Analysis of Oral Health Care for the Aged in Long Term Care Facilities. Oral health and Practice management. http://www.oralhealthjournal.com/news/geriatric-dentistry-analysis-of-oral-health-care-for-the-aged-in-long-term-care-facilities/1000107514/.

[74] Nita Chowdhry, Jolanta Aleksejūnienė, Chris Wyatt, Ross Bryant. Dentists' Perceptions of Providing Care in Long-Term Care Facilities. J Can Dent Assoc 2011;77:b21.

[75] 2006 Census: Portrait of the Canadian Population in 2006, by Age and Sex: National portrait More seniors, fewer children. . http://www12.statcan.gc.ca/census-recensement/2006/as-sa/97-551/figures/c1-eng.cfm.

[76] A Glimpse At Residential Care Facilities.http://www.longtermcarecanada.com/long_term_care_resources/Glimpse_Residential_Care_Facilities.html.

[77] The Oral Health Module of the Canadian Health Measures Survey (CHMS). http://www.hc-sc.gc.ca/hl-vs/pubs/oral-bucco/fact-fiche-oral-bucco-stat-eng.php

[78] Socio-Demographic Profiles of Saskatchewan Women Senior Women. http://www.socialservices.gov.sk.ca/senior-women.pdf.

[79] Quiñonez C, Figueiredo R, Azarpazhooh A, Locker D. Public preferences for seeking publicly financed dental care and professional preferences for structuring it. Community Dent Oral Epidemiol. 2010 Apr;38(2):152-8

[80] Dr. Mohan Teekasingh, Navneet Bhullar, Terran Strang, Sarfraz Afzal. A Comparison Study of the Perceptions Regarding Dental Treatment and Accessibility to Care for Special Health Care Needs Patients.

[81] Poul Erik Petersen. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO Global Oral Health Programme. Community Dentistry and oral epidemiology. Article first published online: 9 OCT 2008 DOI: 10.1046/j..2003.com122.x.

[82] H. Asuman Kiyak, M. Nan Grayston, Carol Lowe Crinean. Oral health problems and needs of nursing home residents. Community Dentistry and Oral Epidemiology Volume 21, Issue 1, pages 49–52, February 1993.

[83] More oral health care needed for ageing populations. Bulletin of the World Health Organization | September 2005, 83 (9) . http://www.scielosp.org/pdf/bwho/v83n9/v83n9a06.pdf.

[84] Cypress Health Regions. http://www.cypresshealth.ca/about.htm.

[85] Ronald G. Smith. Oral Health for a Lifetime. J Can Dent Assoc 2010;76:a169.

[86] Patricia Ryan Coleman, PhD, RN, APRN, BC. Promoting Oral Health in Elder Care—Challenges and Opportunities. Journal of Gerontological Nursing Volume 30 · Issue 4:

[87]Ettinger RL. Attitudes and values concerning oral health and utilisation of services among the elderly. Int Dent J. 1992 Oct;42(5):373-84; discussion 385-92.

[88]Melladee F. Marvin Access to Care For Seniors — Dental Concerns. J Can Dent Assoc 2001; 67(9):504-6.

[89] Brothwell DJ, Jay M, Schönwetter DJ. Dental service utilization by independently dwelling older adults in Manitoba, Canada. J Can Dent Assoc. 2008 Mar;74(2):161-161f.

[90] Patricia Coleman. Improving Oral Health Care FOR THE FRAIL ELDERLY: A Review of Widespread Problems AND Best Practices. July • August 2002 Geriatr Nurs 2002;23:189-97.

[91] Jiska Cohen-Mansfield, Barbara Jensen .The Preference and Importance of Bathing, Toileting and Mouth Care Habits in Older Persons. Gerontology 2005;51:375-385 (DOI: 10.1159/000088701).

[92] Inger Wårdh, Lars Andersson, Stefan Sörensen . Staff attitudes to oral health care. A comparative study of registered nurses, nursing assistants and home care aides. Gerodontology Volume 14, Issue 1, pages 28–32, July 1997.

[93] Rita A. Jablonski. Examining Oral Health in Nursing Home Residents and Overcoming Mouth Care–Resistive Behaviors. Annals of Long-Term Care: Clinical Care and Aging 2010;18[1]:21-26.

[94] Faerella Boczko, Siobhan McKeon, Dana Sturkie,.Long-Term Care and Oral Health Knowledge. (J Am Med Dir Assoc 2009; 10: 204–206).

[95] Carolyn J. Rosenthal. Office of Gerontological Studies McMaster University Hamilton, Ontario, Canada. January 1997. http://socserv.socsci.mcmaster.ca/iesop/papers/iesop_10.pdf.

[96] Michael I. MacEntee , Sally Thorne, Arminee Kazanjian . Conflicting priorities: oral health in long-term care. Special Care in Dentistry Volume 19, Issue 4, pages 164–172, July 1999.

[97] M.H. Hobdell,1 E. R. Oliveira,2 R. Bautista,3 N.G. Myburgh,4 R. Lalloo,5 S. Narendran6 and N. W. Johnson7. Oral diseases and socio-economic status (SES). Refereed paper Received 01.03.02; Accepted 06.09.02 © British Dental Journal 2003; 194: 91–96.

[98] 98. Oral Healthcare and the Frail Elder: A Clinical Perspective. By Michael I. MacEntee, Frauke Miller, Chris Wyatt. First Edition 2011

[99] Improving Oral Health for the Elderly. An Interdisciplinary Approach. Lamster, Ira B.; Northridge, Mary E. (Eds.). 2008, XXVI, 510 p. 83 illus.

[100] Patricia Coleman. Opportunities for nursing-dental collaboration: Addressing oral health needs among the elderly. Nursing Outlook Volume 53, Issue 1 , Pages 33-39, January 2005.

[101] Nicol R, Petrina Sweeney M, McHugh S, Bagg J. Effectiveness of health care worker training on the oral health of elderly residents of nursing homes. Community Dent Oral Epidemiol. 2005 Apr;33(2):115-24.

[102] Improving Dental and Oral Care Services for Nursing Facility Residents Final Report January 20, 2005. The TRECS Institute.
http://www.fdhc.state.fl.us/mchq/long_term_care/trust_fund/pdf/TandemDental.pdf.

[103] Preeti Prakash, Herenia P Lawrence, Bart J Harvey, Warren J McIsaacHardy Limeback, and James L Leake. Early childhood caries and infant oral health: Paediatricians' and family physicians' knowledge, practices and training. Paediatr Child Health. 2006 March; 11(3): 151–157.

[104] ALAN B. DOUGLASS, RUSSELL MAIER. Promoting Oral Health: The Family Physician's Role. Am Fam Physician. 2008 Oct 1;78(7):814-815.

---

[105] Ronald L. Ettinger. Oral health and the aging population. J Am Dent Assoc, Vol 138, No suppl_1, 5S-6S.

[106]Naseem Shah. Teaching, Learning, and Assessment in Geriatric Dentistry: Researching Models of Practice. J Dent Educ. 74(1): 20-28 2010 © 2010 American Dental Education Association.

[107] Petersen PE. Priorities for research for oral health in the 21st century--the approach of the WHO Global Oral Health Programme. Community Dent Health. 2005 Jun;22(2):71-4.

[108] JOHN J. WARREN, HOWARD J. COWEN, CATHERINE M. WATKINS, JED. S. HAND. DENTAL CARIES PREVALENCE AND DENTAL CARE UTILIZATION AMONG THE VERY OLD. The Journal of the American Dental Association November 1, 2000 vol. 131 no. 11 1571-1579.

[109] Paula Moynihan1, Poul Erik Petersen. Diet, nutrition and the prevention of dental diseases. Public Health Nutrition: 7(1A), 201–226

[110] Chris C.L. Wyatt. Elderly Canadians Residing in Long-term Care Hospitals: Part II. Dental Caries Status. J Can Dent Assoc 2002; 68(6):359-63.

[111] Frauke Müller, Manuel Naharro, Gunnar E. Carlsson. What are the prevalence and incidence of tooth loss in the adult and elderly population in Europe? Clinical Oral Implants Research Volume 18, Issue Supplement s3, pages 2–14, June 2007.

[112] John Joseph Warren, Catherine Ann Watkins, Howard Jeffry Cowen, Jed Stephen Hand, Steven Marc Levy, Raymond Andrew Kuthy. Tooth loss in the very old: 13–15-year incidence among elderly Iowans. Community Dentistry and Oral Epidemiology Volume 30, Issue 1, pages 29–37, February 2002.

[113] Hsin-Chia Hung, Walter Willett, Anwar Merchant, Bernard A. Rosner, Alberto Ascherio, Kaumudi J. Joshipura. Oral Health and Peripheral Arterial Disease. Circulation. 2003; 107: 1152-1157.

[114]ELIZABETH KRALL, CATHERINE HAYES, RAUL GARCIA . HOW DENTITION STATUS AND MASTICATORY FUNCTION AFFECT NUTRIENT INTAKE. . JADA, Vol. 129, September 1998 1261.

[115] Jerry D. Michel. Basic Dental Health for Older Adults. University of Missouri Extension. http://extension.missouri.edu/p/GG5.

[116]David Bartlett. A New Look at Erosive Tooth Wear in Elderly People. The Journal of the American Dental Association September 1, 2007 vol. 138 no. suppl 1 21S-25S

[117] Dr Bruce L Pihlstrom , Bryan S Michalowicz, Newell W Johnson . Periodontal diseases. The Lancet, Volume 366, Issue 9499, Pages 1809 - 1820, 19 November 2005.

[118] G. Rutger Persson, Ola Ohlsson, Thomas Pettersson, Stefan Renvert. Chronic periodontitis, a significant relationship with acute myocardial infarction. Eur Heart J (2003) 24 (23): 2108-2115.

[119] Laurent M, Gogly B, Tahmasebi F, Paillaud E. Oropharyngeal candidiasis in elderly patients. Geriatr Psychol Neuropsychiatr Vieil. 2011 Mar;9(1):21-8.

[120] Ahmedin Jemal, Rebecca Siegel, Elizabeth Ward, Yongping Hao, Jiaquan Xu, Taylor Murray; Michael J. Thun, . Cancer Statistics, 2008. CA Cancer J Clin 2008;58:71–96.

[121] Tezal M, Sullivan MA, Reid ME, Marshall JR, Hyland A, Loree T, Lillis C, Hauck L, Wactawski-Wende J, Scannapieco FA. Chronic periodontitis and the risk of tongue cancer. Arch Otolaryngol Head Neck Surg. 2007 May;133(5):450-4.

[122] Tezal M, Sullivan MA, Hyland A, Marshall JR, Stoler D, Reid ME, Loree TR, Rigual NR, Merzianu M, Hauck L, Lillis C, Wactawski-Wende J, Scannapieco FA. Chronic periodontitis and the incidence of head and neck squamous cell carcinoma. Cancer Epidemiol Biomarkers Prev. 2009 Sep;18(9):2406-12.

[123] S. Zainab, N.M. Ismail, T.H. Norbanee, A.R. Ismail b. The prevalence of denture wearing and the impact on the oral health related quality of life among elderly in Kota Bharu, Kelantan. Archives of Orofacial Sciences (2008), 3(1): 17-22 17.

[124]Jainkittivong A, Aneksuk V, Langlais RP. Oral mucosal conditions in elderly dental patients. Oral Dis. 2002 Jul;8(4):218-23.

[125] Takeyoshi Yoneyama, Mitsuyoshi Yoshida, et al . Oral Care Reduces Pneumonia in Older Patients in Nursing Homes. J Am Geriatr Soc 50:430–433, 2002.

[126] Kaumudi Joshipura, Juan Carlos Zevallos, Christine Seel Ritchie. Strength of Evidence Relating Periodontal Disease and Atherosclerotic Disease. Compend Contin Educ Dent. 2009 September; 30(7): 430–439.

[127] Janket, S., Meurman, J. & Sanz, M., Oral Health, Atherosclerosis, and Cardiovascular Disease. Crit Rev Oral Biol Med, 15, 403-413, 2004.

[128] Thomas Dietrich, Monik Jimenez, Elizabeth A. Krall Kaye, Pantel S. Vokonas, Raul I. Garcia. Age-Dependent Associations Between Chronic Periodontitis/Edentulism and Risk of Coronary Heart Disease. Circulation. 2008; 117: 1668-1674 Published online before print March 24, 2008, doi: 10.1161/CIRCULATIONAHA.107.711507.

[129] Morrison HI, Ellison LF, Taylor GW. Periodontal disease and risk of fatal coronary heart and cerebrovascular diseases. J Cardiovasc Risk. Cancer Bureau, Health Canada 1999 Feb;6(1):7-11.

[130] Pessoa L, Galvão V, Santos-Neto L. Periodontal disease as a risk factor for cardiovascular disease: Suggestion of a further link in systemic lupus erythematosus. Med Hypotheses. 2011 May 20. Epub ahead of print.

[131] Michael D. Turner, Jonathan A. Ship. Dry Mouth and Its Effects on the Oral Health of Elderly People. The Journal of the American Dental Association September 1, 2007 vol. 138 no. suppl 1 15S-20S.

[132] Dominique S. Michaud, Kaumudi Joshipura, Edward Giovannucci and Charles S. Fuchs. A Prospective Study of Periodontal Disease and Pancreatic Cancer in US Male Health Professionals. JNCI J Natl Cancer Inst (17 January 2007) 99 (2): 171-175.

[133] XIAOJING LI, KRISTIN M. KOLLTVEIT, LEIF TRONSTAD, INGAR OLSEN. Systemic Diseases Caused by Oral Infection. CLINICAL MICROBIOLOGY REVIEWS. Oct. 2000, p. 547–558 Vol. 13, No. 4.

[134] M. Imsand , J-P Janssens , R. Auckenthaler , P. Mojon, E. Budtz-Jørgensen. Bronchopneumonia and oral health in hospitalized older patients. A pilot study. Gerodontology Volume 19, Issue 2, pages 66–72, December 2002.

[135] Susan E. Langmore, Margaret S. Terpenning, Anthony Schork, Yinmiao Chen, Joseph T. Murray, Dennis Lopatin and Walter J. Loesche. Predictors of Aspiration Pneumonia: How Important Is Dysphagia? Dysphagia Volume 13, Number 2, 69-81, DOI: 10.1007/PL00009559.

[136] Paul E. Marik, Danielle Kaplan. Aspiration Pneumonia and Dysphagia in the Elderly. Chest 2003;124;328-336.

[137] Petteri Sjo¨ gren, Erika Nilsson, Marianne Forsell, Olle Johansson, and Janet Hoogstraate. 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. The American Geriatrics Society. JAGS 56:2124–2130, 2008

[138] Mieko Adachi, Kazuyuki Ishihara, Shu Abe, Katsuji Okuda, Tatsuya Ishikawa. Effect of professional oral health care on the elderly living in nursing homes. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2002;94:191-5

[139] Mária Albrecht[1,*], Jolán Bánóczy[1], Gyula Tamás Jr. Dental and oral symptoms of diabetes mellitus. Community Dentistry and Oral Epidemiology. Volume 16, Issue 6, pages 378–380, December 1988.

[140] Ritchie CS, Joshipura K, Silliman RA, Miller B, Douglas CW. Oral health problems and significant weight loss among community-dwelling older adults. J Gerontol A Biol Sci Med Sci. 2000 Jul;55(7):M366-71.

[141] Akihiro Yoshihara, Yoshikazu Seida, Nobuhiro Hanada, Hideo Miyazaki. A longitudinal study of the relationship between periodontal disease and bone mineral density in community-dwelling older adults. Journal of Clinical Periodontology Volume 31, Issue 8, pages 680–684, August 2004

[142] Friedlander AH, Kawakami KK, Ganzell S, Fitten LJ. Dental management of the geriatric patient with major depression. Spec Care Dentist. 1993 Nov-Dec;13(6):249-53.

[143] Demographic and Prevalence Statistics. Canadian Mental Health Association. http://www.ontario.cmha.ca/seniors.asp?cID=5801.

[144] Adut R, Adut M, Mann J, Berkey D. Oral health in dementia patients. Refuat Hapeh Vehashinayim. 2003 Jan;20(1):46-53, 80.

[145] Hümeyra Kocaelli, Mehmet Yaltirik, , L.Ilhan Yargic, Hakan Özbas. Alzheimer's disease and dental management. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology. Volume 93, Issue 5 , Pages 521-524, May 2002

[146] Loyola-Rodriguez JP, Martinez-Martinez RE, Abud-Mendoza C, Patiño-Marin N, Seymour GJ. Rheumatoid arthritis and the role of oral bacteria. J Oral Microbiol. 2010 Dec 21;2. doi: 10.3402/jom.v2i0.5784.

[147] Ogrendik M. Rheumatoid arthritis is linked to oral bacteria: etiological association. Mod Rheumatol. 2009;19(5):453-6. Epub 2009 Jun 24.

[148] P. Ortiz,[*] N.F. Bissada,[*] L. Palomo,[*] Y.W. Han,[*] M.S. Al-Zahrani,[†] A. Panneerselvam,[‡] and A. Askari. Periodontal Therapy Reduces the Severity of Active Rheumatoid Arthritis in Patients Treated With or Without Tumor Necrosis Factor Inhibitors. Journal of Periodontology April 2009, Vol. 80, No. 4, Pages 535-540 , DOI 10.1902/jop.2009.080447 (doi:10.1902/jop.2009.080447)

[149] Hanaoka A, Kashihara K. Increased frequencies of caries, periodontal disease and tooth loss in patients with Parkinson's disease. J Clin Neurosci. 2009 Oct;16(10):1279-82. Epub 2009 Jun 30.

[150] Bakke M, Larsen SL, Lautrup C, Karlsborg M. Orofacial function and oral health in patients with Parkinson's disease. Eur J Oral Sci. 2011 Feb;119(1):27-32. doi: 10.1111/j.1600-0722.2010.00802.x.

[151] Wendy Baird."When did you last see your dentist?" - the oral health of people with multiple sclerosis. Way Ahead 2004;8(1):6-7.

[152] Jackie Smorang. Seniors' Oral Health in the Calgary Health Region; March 2003. http://www.albertahealthservices.ca/ps-1042857-2003-seniors-report.pdf

[153] Government of Alberta Seniors and Community Supports. http://www.seniors.gov.ab.ca/financial_assistance/dasp/

[154] Geriatric Dentistry Program. UBC Dentistry, University of British Columbia. http://www.dentistry.ubc.ca/CommunityPrograms/Geriatric/default.asp

[155] Centre Community Oral Health. Faculty of Dentistry, University of Manitoba. http://umanitoba.ca/faculties/dentistry/ccoh/ccoh_deerLodgeCentre.html

[156] Halton Oral Health Outreach Program. A Community Model for Accessing Oral Care Services that works. Halton region august 2008. www.halton.ca/common/pages/UserFile.aspx?fileId=15337

[157] Toronto Public Health. Dental Services. http://www.toronto.ca/health/dental/free_dental_care.htm

[158]Public dental program for seniors. Access to Care. Federal Provincial and Territorial Dental Working Group. http://www.fptdwg.ca/English/e-pe.html#seniors.

[159] Improving and Maintaining Oral Health in Prince Edward Island. A Strategic Plan to the year 2010. Dental Public Health, Division of Pharmacy and Dentistry, Department of Social Services & Seniors; December, 2005. http://cbpp-pcpe.phac-aspc.gc.ca/uploads/S1_PEI-Strategic-Plan_2005-10.pdf.

[160] Improving and Maintaining Oral Health in Prince Edward Island. A Strategic Plan to the year 2010. Dental Public Health, Division of Pharmacy and Dentistry, Department of Social Services & Seniors; December, 2005. http://cbpp-pcpe.phac-aspc.gc.ca/uploads/S1_PEI-Strategic-Plan_2005-10.pdf.