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Literature Review

Would in Home Oral Health Services Benefit Elderly Oral Health Status

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Abstract

Thanks to the improvements of modern medicine coupled with increased knowledge of healthy lifestyle habits, our population is aging at a rapid pace. We are living longer and spending a greater number of years living at home than ever before. Many chronic illnesses and diseases that were once considered terminal have become managed by medication and surgical procedures. Quality of life has been significantly increased for many members of this cohort as a result of these advanced treatment options.

This literature review reveals that many older adult patients take multiple medications that can deplete the health of the dentition rather rapidly. There is often dexterity limitations and cognitive decline that can impede on self-care. In addition, many have challenges with mobility and transportation that can limit the access to quality dental care. The needs are greater than the systems that we currently have to meet those needs. This research takes a closer look at the aging population overall health needs, oral health needs, and current barriers that exist to care for this segment of the population.

Oral health remains an area of concern for this aging population. Research has made strong connections between oral health and systemic well-being. Older adults that are able to maintain a stable dentition have increased quality of life in all aspects. The understanding of the bidirectional relationship that occurs between the oral cavity and the systems of the body create a sense of urgency to create policy and procedures within our communities that address the needs of our older adults. Collaboration between healthcare providers and the design of teams that care for this population that includes dental professionals may be considered. Healthcare and dental professionals must work together to develop ways to meet the needs of this population in a way that is effective.

Keywords: *Oral Health Services; Oral Health Status; Quality of Life*

Introduction

Our older adult population is continuing to steadily grow in size. It has been predicted by the National Center for Health Statistics (2015) that by 2030, 88.5 million Americans over the age of 65 will reside in this group (NCHS, 2015). More members of this older population will likely live longer in their own homes, and live in their own homes for a greater number of years than preceding generations. The dynamics of this cohort is widespread and encompasses a group that ranges from unimpaired to functionally reliant on others for total care in all aspects of daily living. According to the National Institute of Health, strong connections have been made between oral health and some of the most common chronic diseases that this cohort faces [1]. More members of this cohort are retaining a greater number of their natural teeth than ever before, and have been exposed to more preventive care than previous generations. Discussion about the connection between oral health and systemic wellness has been gaining momentum in recent decades among healthcare professionals. Consideration of functional ability or limitations of our aging population is an essential component of the ability to gain access to preventive oral health services [1]. Physical limitations of our older adults reduce the ability to access routine periodic dental care. For a patient

that is confined to their home, will access to in-home preventive services by an oral health professional compared to no in-home preventive services provide the patient with greater oral health comfort and better caries control? We will look at the current literature to answer this question.

A multidisciplinary approach to meeting the needs of this population could prove to be most effective for both patients and healthcare providers.

Statement of the Problem

This study will investigate the oral health status of homebound patients and determine if oral healthcare professionals current practices are meeting the needs of this population to improve this population's oral health status. There are significant dental needs in this population. In addition, there are physical limitations for this population to gain access to dental care in the same fashion as another member of the community.

Research Question

For a patient that is confined to their home, will access to in-home preventive services by an oral health professional compared to no in-home preventive services provide the patient with greater oral health comfort and better caries control?

Purpose of the Study

The purpose of this study is to evaluate the current research on this topic to determine the variables that exist to help explain the current oral health status of homebound elderly patients. To identify the oral health status of homebound patients that knowingly have little or no access to routine preventative care. To assess what interventions are currently in place to improve the oral health status of this population, articulate the barriers to care for this population, and determine if oral health care providers can provide this population with greater oral health comfort and better caries control.

Significance of the Study

This study will help to assess the needs of our older homebound population, determine the cohort's level of oral health, and spark a discussion that may create strategies to meet the needs of this population. The oral health needs of this population is a growing concern for all of us who care for them. As research links chronic systemic diseases with oral health, the significance of knowing the oral health status of this cohort, and the barriers that limit access to care for them increases. Research of this topic is intended to increase knowledge of the oral health status of homebound elderly that results in the creation of initiatives and programs that target solutions to the problems that this population faces.

Definition of Terms

- Access to Care: The timely use of personal health services to achieve the best possible health outcomes (Institute of Medicine, 1993).
- Frail(ty): Not strong enough to endure strain, pressure, or strenuous effort. weakly applies to deficiency (Websters Dictionary, 2016).
- Functional Limitations: Reduction inability to perform due to mental or physical limitations.
- Xerostomia: The subjective sensation of dry mouth (ADA.org, 2016).
- Edentulous: The lack of teeth within the oral cavity.
- Cognitive Impairments: Deficits in thinking and memory that impair the ability to perform daily tasks.
- Comorbidities: When two or more diseases or illnesses exist within one person at the same time.
- Polypharmacy: The use of multiple medications
- (DMFT): Decayed, Missing, Filled, Teeth

Limitations of the Study

Most of the research that has been done contains small sample sizes. There is limited research on homebound elderly patients that are actively being cared for by an oral health care professional. Due to a large number of contributing health factors related to homebound elderly populations, stable sample sizes are difficult to maintain for long term studies. Self-perception of oral health status among many homebound elderly is not consistent with the clinical findings upon examination.

Delimitations

Due to the limited research on homebound elderly populations, some research included residents of long-term care facilities in the data assessment. These populations show similar barriers and oral health status, but are easier to research due to location, therefore, there is more information available for elderly oral health status that reside in nursing home or long term care facilities so it was included in the research.

Organization of the Remainder of the Study

Chapter 1 has presented the introduction, statement of the problem, research question, and significance of the study. Chapter 2 contains the review of the literature and research related to homebound elderly oral health needs, the level of health that is seen in this population, the perception of oral health and needs of this population, the level of education that exists in regard to oral health significance, and the barriers to care that exist for this population will be discussed. Chapter 5 will contain a summary of the study and the findings, conclusions, discussion, and recommendations for further research studies on this topic.

Review of the Literature

Chapter 2 provides an extensive review of the literature and research related to homebound elderly. The chapter will be divided into four sections, (a) Population characteristics (b) Homebound elderly health characteristics (c) Oral health characteristics of Homebound elderly (d) perception of oral health needs and level of knowledge of oral health significance, (e) Barriers to oral health care providers that exist for this population.(f) Oral healthcare impact on homebound elderly oral health needs.

Population Character Statistics

According to a report on population trends by Ortman, Velkoff, and Hogan (2014) between 2012 and 2050 the older adult population will experience considerable growth. The number of adults over the age of 65 in 2012 was 43.1 million. By 2050, this number is expected to reach 83.7 million [2]. In addition to this growth, our baby boomer generation started turning 65 in 2011. Not only is this group much larger in size than previous generations, this group is expected to live longer that previous cohorts Ortman., *et al.* (2014) point out that public health initiatives, behavioral changes, and medical advancements have changed mortality predictions to shift the predictions of the life expectancy of this cohort. The overall health and wellness of many members of this group have improved due to numerous variables, yet many of the members of this group suffer from chronic disease along with decreased cognitive function, physical disabilities, and limited access to care. This populations dynamics is expected to become much older. By 2030, more than 20% of U.S. residents are projected to be over 65, compared to 13% in 2010, and 9.8% in 1970 [2]. Information strongly connected to this research is discussed in the population projection report. Ortman., *et al.* (2014) found that the number of people in the oldest age group, 85 and older is expected to grow from 5.9 million in 2012 to 8.9 million in 2030, and 18 million by 2050 [2].

A recent study by Griffin, Jones, Brunson, Griffin and Bailey (2012) states that because the risk of chronic conditions increases with age, it is important to examine the interplay of these disease with oral disease and their combined impact on overall health among older adults [3].

Homebound Elderly

There is no clear statistical data on how many of the people that reside in this cohort over 65 years of age would be classified as homebound, or projections that show estimates of how many will become homebound, as the baby boomer generation ages. Our older population is faced with many age-related physiological changes that can impact their daily living situations. An article by Feinberg (2012) stated that for homebound patients, the family is the main source of support with 66% relying solely on their family for help, 26% receive some

help from caregivers and only 9% having paid help. Estimates show that 40.3 billion hours of care are given to homebound populations by family members each year [4]. Many of our older populations that live on their own rely on the help of family members and in-home caregivers to meet many of their daily needs. An older report put out by the Academy of Home Physicians estimated to have 4 million homebound frail elderly by 2010. While an exact number is difficult to calculate, looking at population trends that have been discussed by Ortman., *et al.* (2014), we will have 5.9 million Americans over the age of 85 in 2012, the population 85 years and over will double by 2036 and then triple by 2049. Given this information, the estimate of 4 million homebound elderly is a safe, yet conservative estimate [2].

Yellowitz and Schneiderman (2014) research indicates that as the elderly in the United States increase in number and percentage, there will be an ever-increasing vulnerable or frail aged cohort, who have physical and/or cognitive conditions and disabilities, limited financial resources and cannot readily access health care [5].

Homebound elderly Health Characteristics

When talking about the aging population, it is appropriate to consider the functional status and health condition rather than age. Yellowitz and Schneiderman (2014) state that older adults display great variability in the physical functional and cognitive health as well as significant variability in their health needs and expectations [5]. There is a wide variation of health status among many people that reside within the same age bracket. As a result, older adults should be discussed according to physical limitations, functional impairments, and cognitive abilities in addition to common health trends associated with the age groups. For clarity, the level of functional independence, frailty, and functional dependent needs will be used to describe the variations among groups.

Chronic Diseases

Homebound elderly general health as a group has improved over the last three decades. Even with the news of longevity, homebound elderly tend to suffer from chronic illness, sometimes they battle several chronic illnesses. The blessing of longevity comes with the price of the burden of increased risk of chronic illness. Yellowitz and Schneiderman (2014) findings show that in that age 70 - 80 years of age close to 75% have at least one chronic disease, with close to 50% having two or more. The prevalence of chronic conditions and disease increases with age [5]. According to the National Center Health Statistics (NCHS, 2015) 21.7% of non-institutionalized people that are 65 and older are in fair or poor health. This statistic increases to 26% up to 74 years old and rises to 33.4% for elderly over the age of 75. According to a recent report by the U.S. DHHS (2015), About 29% (13.3 million) of all non-institutionalized older persons in 2015 lived alone (9.2 million women, 4.1 million men). They represented 36% of older women and 20% of older men. The proportion living alone increases with advanced age. Among women aged 75 and over, for example, almost half (46%) lived alone [6].

According to the National Center Health Statistics (NCHS, 2015), the most common chronic diseases for this population is Hypertension, cancer, chronic low respiratory disease, diabetes, arthritis, and stroke. Hypertension is the leading chronic health issue and affects 63.4% of men age 65 -74 and rises to 72.4% over the age of 75. Hypertension affects 64.3% of women 65 - 74 and 79.9% of women above the age of 75 (NCHS, 2015). Diabetes and cardiovascular health have been shown to have strong links to oral health, and diagnosis of these diseases continues to rise within this population. The percentage of people diagnosed with diabetes increased 140% (9.1% to 21.8%) for people 65 - 74 and 125% (8.9% - 20.0%) for those aged 75 and older. Additionally, it can be stated that there is a strong association between poor general health and poor oral health (NCHS, 2015).

In a recent study done by Kanzigg and Hunt (2016) it was discussed that one out of every ten pneumonia related nursing home deaths could have possibly been prevented by the patient's oral health status, in addition they cited that elderly patients frequently experience health consequences from poor oral health and will, therefore, be at a higher risk for developing circulatory infections as well as inflammatory response issues [7]. Griffin., *et al.* (2012) cited a study that showed oral hygiene care can prevent respiratory infections and death from pneumonia in elderly people in the hospital and nursing homes [3].

Sensory Changes

Yellowitz and Schneiderman (2014) found that individuals from 65 - 74 years of age have better general and oral health, have maintained more teeth, and have a more preventative attitude toward healthcare than those who are 85 and older [5]. As we develop a greater

understanding of the significance of oral health and how it is connected to many chronic diseases and illnesses, we begin to develop a greater understanding of how important it is to address the oral health needs of our aging population.

There are many sensory related age changes that occur homebound elderly people face. Sensory changes are important to discuss because they create a barrier to care that needs to be considered when trying to improve access to care for this population. Sensory changes can have an impact on older adults abilities and habits. Yellowitz and Schneiderman (2014) state that vision, hearing, and medication-related issues can have a significant impact on the quality of life for older adults. Sensory impairments were identified as a significant issue for older adults with one of six having impaired vision and one of four having impaired hearing [5]. These sensory changes become more magnified as this population ages, limiting independence and ability for accurate communication.

Functional and Cognitive Changes

In addition to sensory changes that occur, functional abilities can diminish with our aging population. In a report put out by National Center for Health Statistics (NCHS) (2015) it states that difficulty doing functionally independent things like errands increase with age. Women in all age groups were more likely than men to report difficulty doing errands alone ranging from 26% more likely over 65 and 72% more likely over the age of 85 compared to men from the same age group (NCHS, 2015). There is concern about diminished cognitive function, pair that with a depletion of dexterity, as well as a decreased ability to detect early onset of problems due to decreased ability to recognize pain early on.

According to the National Center for Health Statistics (2015) among non-institutionalized men and women the prevalence of self-reporting serious difficulty concentrating, remembering, or making decisions was higher among older age groups 75 - 84 and 85 and older than among younger age groups. and was similar among both men and women (NCHS, 2015).

One popular measurement used to determine the level of disability present among homebound elderly people is called the Activities of Daily Living (ADL's). The components of this assessment include basic self-care activities like bathing, eating, dressing, moving around the house, and walking. In addition, there are more cognitive Instrumental measures (ADL's) that include cooking, shopping, budgeting finances, taking medications, and communication. Yellowitz and Schneiderman (2014) state that Medicare beneficiaries age 65 and older reported difficulty in performing one or more ADL and additionally 12% reported difficulty with one or more ADL. Limitations in activities due to chronic conditions increase with age [5].

Oral Health Characteristics of Homebound Elderly

Oral health has become a key measure of overall health and quality of life. It is one of the measuring points that are used to determine progress of the goals set by the Healthy People 2020 initiatives. A report brief written about underserved oral health access to care concluded that the separation of oral health care from overall health care is a factor in limiting access to oral health care for many Americans [8]. The separation between oral health and overall health can create a barrier of understanding among both healthcare providers and the patients that they are caring for. Tooth loss and adult tooth decay are strong oral health indicators and provide us with the ability to measure progress in the area of oral health among populations. Yellowitz and Schneiderman (2014) study of elders identifies that certain systemic conditions and diseases (diabetes, obesity, and osteoporosis) are risk factors that may increase susceptibility to periodontal diseases by either modifying or increasing the host response to bacteria and inflammation [5]. Oral health is an important component of general health and wellbeing and is a contributing factor when trying to manage chronic disease. Griffin., *et al.* (2012) point out that oral health and other chronic disease share common risk factors and have a bidirectional effect on one another [3]. Understanding the component of oral health and its contribution to chronic disease management is an important factor for healthcare providers of all professions. Our older population is more likely to take medications and suffer from at least some side effects from those medications that contribute to oral health issues. Medications can cause challenges in maintaining oral health due to side effects attached to those medications that change patient abilities, desires, and salivary flow. Generally speaking, as we age, our health tends to decline.

Xerostomia

Xerostomia has been shown to increase with age and becomes more prevalent in individuals that take medications or have chronic diseases. In a cohort study of 302 homebound elderly patients that require moderate and substantial needs done by Stromberg, Holmen,

Hagman-Gustafsson, Gabre and Wardh (2012) it was indicated that older people with subjective oral dryness are more likely to have problems with chewing and to experience problems with daily activities such as talking and eating [9]. Another study by Griffin., *et al.* (2012) found that saliva protects the teeth against dental caries by lubricating the mouth and gums, which in turn reduces bacteria growth, and provides minerals, such as calcium, phosphate, and fluoride needed to remineralize tooth surfaces where tooth decay is just beginning [3]. Many older adults have lost attachment around their teeth and as a result, have more root surface exposure that is not protected by enamel. When a patient experiences xerostomia, the bacteria, and sticky plaque has a tendency to be more prevalent around the gum line in the area where there is no enamel protecting the tooth surface.

The association between xerostomia and medication use is well understood. Medications that are prescribed to manage chronic diseases can have a negative impact on oral health status. A cross-sectional study by Viljakainen, Komulainen, Suominen, Hartikainen and Tiihomen (2016) discuss the considerable number of medications that members of this cohort can be taking, and the impact that it can have on oral health status. In this study, the mean age of the 270 members of the study was 84.5 (SD 5.4 years) and the mean number of drugs used was 9.0 (SD 3.7) and more than half of the home care clients were taking ten or more medications daily [10]. In a retrospective cohort study by Villa, Nordic and Gohel (2015) a risk model was created to help better understand the association between a wide range of risk factors and xerostomia presence. Age, gender, systemic diseases, and medications were the primary assessment categories used to create the risk model for xerostomia [11]. In this study, people that were at highest risk of xerostomia indicated that they had difficulty with wearing dentures, eating certain foods, speaking, and swallowing [11]. This study by Villa., *et al.* (2015) also found that the greater number of medications that were prescribed, the higher the risk of xerostomia and that anticoagulants, antidepressants, antihypertensives, antiretrovirals, hypoglycemics, levothyroxine, multivitamins, (NSAID's), and supplements increased the odds of xerostomia risk [11]. Viljakainen., *et al.* (2016) found that frailty and high comorbidity are common factors behind both xerostomia and excessive polypharmacy [10]. In one text by Brown (2014), it was noted that lack of saliva for any reason gives bacteria a better environment to build plaque. Xerostomia is often accompanied by loss of taste, and pain of the tongue, factors that interfere with the enjoyment of food [12].

Edentulous

According to the NCHS (2015) report, nearly 19% of adults aged 65 and older were edentulous in 2011 - 2012. It was twice as prevalent among adults 75 and older at (26%) and was similar between both men (18%) and women (19%) (NCHS, 2015). This information correlates well with Yellowitz and Schneiderman (2014), study that identified those 65 - 74 years of age have better general and oral health, have maintained more teeth and have a more preventive attitude toward health care than those 85 and older [5]. In addition to this, Yellowitz and Schneiderman (2014) point out that in 2010 nearly 24% of non-institutionalized adults 65 years or older were edentulous compared to 33% in 1993. Ornstein., *et al.* (2014) study indicated that of the 125 subjects in their study, 24% were edentulous. This study aligns well with the NCHS (2015) report, given that the mean age of the subjects in this study was 81.4 +/- 12.3 years [13]. It is important to point out that in this study, of the 24% that were edentulous, 18% were lacking appropriate dentures for one or both arches. 64% of the members of this study were in need of a replacement partial or denture to replace missing teeth and of those that wore dentures, 28% needed their denture replaced [13]. Other studies have indicated that chewing with removable dentures is at least 30 - 40% less efficient than chewing with natural teeth [3].

Untreated Dental Issues

In the study done by Ornstein., *et al.* (2015) 96% of the subjects states that no dental professional had visited them at home since they have become homebound. 61% had been at least 3 years since they had seen a dentist, and 58% stated that it had been between 3 and 40 years since their last dental visit (mean 11.3 +/- 8.2 years) [13].

According to the National Center for Health Statistics (NCHS) data brief (2015), the prevalence of dental caries was similar between those 65 - 74 and those over 75, nearly 19% of adults over 65 have untreated dental decay. 96% of nearly all adults over 65 have a history of dental caries [14]. This translates to about one in every five adults over the age of 65 having untreated tooth decay. Recent research by Griffin., *et al.* (2012) has shown that fluorides, whether used in toothpaste, professionally applied, or delivered through community water systems, reduce coronal caries incidence in adults by about 25% [3]. Ornstein., *et al.* (2015) did a cross-sectional analysis of 125 home-

bound elderly adults, it showed that 78.9% had at least one decayed tooth, 40% were in need of restorations and 45.6% were in need of extractions [13]. This study indicates that the homebound elderly needs may be even more significant than the population estimates put out by the NCHS data report. One profound statistic found in this report was from the Breakdown of the GOHAI index when participants in the study were asked how often do you need to take medication to relieve pain around your teeth and gums, 16.4% responded always or often [13].

Periodontal Disease

In a Research article by Di Benedetto, Gigante, Colucci, and Grano (2013) defined Periodontitis as a chronic infectious inflammatory disease that negatively impacts the periodontium and destroys the remaining tooth supporting structures. Periodontal disease is also a bacterially induced disease that occurs in the oral cavity [15]. Research by Ebersole, Souza, Gordon, and Fox (2012) show that the prevalence of chronic diseases such as periodontal disease and their associated adverse outcomes increases with age, affecting approximately 45% of adults over the age of 50 years in the United States [16]. The literature supports the idea that as we age our risk of periodontal disease increases. In a study by Llambes, Arias-Herrera, and Caffesse (2015) it was stated that the prevalence of periodontal disease increases with age up to the point that 70.1% of adults over the age of 65 were affected by periodontal disease [17]. Studies show that as we age we are more likely to take medications. One study by Natto, Aladmawy, Alshaeri, Alasqah and Papas (2016) showed that many drugs that homebound elderly take routinely were found to have effects on the periodontal tissue, effects that could increase or decrease the cellular response of gingival and periodontal tissue to periodontal disease. This study also showed that one of the main side effects of taking multiple drugs is xerostomia. Xerostomia has been associated with inflammation and bleeding from periodontal structures [18].

In the study done by Ornstein., *et al.* (2015) the clinical assessment showed 31.6% of the homebound elderly members of the study were in need of dental extractions due to periodontal problems. The research by Natto., *et al.* (2016) showed that patients taking six or more medications were 1.20 times more likely to have increased recession but, periodontal probe depths did not change based on the number of medications taken [18]. Periodontal disease can also have an impact on glycemic index control in diabetic elderly patients. In the study done by Llambes., *et al.* (2015) it stated that studies have demonstrated a two way relationship between diabetes and periodontitis, with more severe periodontal tissue destruction in diabetic patients and poorer glycemic control in diabetic subjects with periodontal disease [17]. In addition Llambes., *et al.* stated that short term effects of periodontal treatment are similar in diabetic patients and healthy populations, but more recurrence of periodontal disease can be expected in diabetics where glycemic index is not well controlled [17].

Nutrition can be impacted by oral health and is a strong component of overall health and wellness. Homebound elderly that have inadequate oral health could be at a higher risk of nutritional deficiencies. In a recent research article, it was stated that there are several barriers to an elderly person receiving optimal nutrition, such as the inability to consume enough fruits and vegetables, which may be due to poor dental health or inadequate dentition (JAGS, 2015). The research makes a direct connection between oral health and the amount of fruit and vegetable consumption among the elderly population. Malnutrition has been linked as a risk factor for individuals over 60 that do not have proper oral health care and the ability to chew (JAGS, 2015).

Perception of Oral Health Needs and Significance

Lack of perceived need is one of the most significant barriers when discussing this population as it relates to oral health. In fact, it is mentioned in almost every report as one of the main contributing factors to oral health status among this cohort. Awareness and knowledge of the value of oral health and how it relates to systemic wellness can limit some older adults from seeking care from oral health professionals. According to Yellowitz and Schneiderman (2014), Many of the members of an older cohort were raised during the depression and viewed health and dental care more as a luxury than a preventive routine. For many, dental care was primarily utilized to relieve pain and discomfort [5]. In a recent study of institutionalized elderly by Melo, Sousa, Medeiros, Carreiro, and Lima (2016) 166 elderly residents age 63 - 98 (SD +/- 8.1) were evaluated to determine the accurate level of oral health status versus the perception of oral health among the population. According to the data, only 6% of the sample had 20 or more teeth. The Decayed, Missing, Filled, Teeth (DMFT) was 28.9 (SD +/- 4.7), 66.9% were in need of some kind of prosthesis, and of the 40.9% that had dentures, 71% had displaced teeth in those

dentures [19]. The interesting part of the study done by Melo., *et al.* (2016) was that even with the statistics that were gathered about the oral health status of these individuals, when members of this study were asked about the status of their oral health, 65% reported that they were in good or excellent oral health, despite their oral health conditions [19].

Research by Yellowitz and Schneiderman (2014) state that many older adults are not able or willing to receive routine preventive care due to health conditions, disabilities, access issues, limited financial resources, and or their belief that they do not need care or that it has no value to them [5]. As awareness of the contribution that oral health has on chronic disease, demand for oral health services will grow. To further expand on Melo., *et al*. (2016), Gaszynska, Szatko, Godala, and Gaszynski (2014) research of 259 home care residents were interviewed about their dental treatment needs. Over half of the surveyed residents (59.8%) had objective dental treatment needs. Only 27% were aware of the need for treatment, and only 9.7% reported the need to the personnel [20]. These residents show a significantly inaccurate perception of their own assessment of dental needs versus the objective needs during clinical examination.

In a study done by Ornstein., *et al.* [13] a survey revealed that 93.5% of the 125 homebound elderly participants answered yes when asked if they were interested in home based dental care. 72.2% of denture wearers were interested in new dentures and 42.6% of subjects were interested in having their current denture repaired [13]. This study revealed some interesting oral health perceptions in addition to the clinical findings, 28% of the patients complained about halitosis and 50.4% had chewing limitations, nearly 60% were dissatisfied with their current denture, yet the Geriatric Oral Health Assessment Index (GOHAI), scores of these individuals reveal better perceived oral health than the clinical findings [13]. Ornstein., *et al.* (2015) findings show that the vast majority of homebound populations lack basic dental care and that it negatively affects their quality of life and wellbeing [13]. This report shows that there is a lack of services available for this population, there is a great need for services, but most importantly there is a mixed message regarding the desire for services from this population.

Measuring self-perception can help predict the need for care in some areas of health, but as the research shows in Melo., *et al.* (2016) elderly that had persistent pain from teeth or jaw muscles and joints were more inclined to rate their oral health status as poor, compared to those that were unable to chew or had active decay or infection [19]. Several of the reviews reveal that there is a direct correlation between access to dental care and self-perception of oral health. Additionally, there is a correlation between access to dental care and life satisfaction. In a study by Rigo, Basso, Pauli, Cericato, Paranhos, and Garbin (2015) subjects were analyzed to determine the connection between satisfaction with life and self-perception in oral health as well as experiences with dentists. The results show that older people with higher levels of life satisfaction and a better perception of their own oral health, as well as having a better perceived image of dental surgeons and feel less anxiety about their experience with the dentist [21]. This study showed that both the self-perception that the elderly have of oral health and the experience with dentists have an association with the satisfaction with life [21]. Research supports Melo., *et al* (2016) who concluded that clinical and sociodemographic conditions have little influence on oral health self-perception, possibly because pain is the main factor associated with negative self-perception in these individuals [19].

Barriers to oral health care that exist for this population

Physical (functional) limitations of this cohort are one of the biggest issues for maintaining adequate oral health. Functional limitations reduce the ability for members of this cohort to physically get to the dentist, as well as physically have work done in supine positions. Functional limitations make many homebound elderly have an increased risk for oral disease. Poor overall health conditions can limit the ability to undergo oral health treatment. Yellowitz and Schneiderman (2014) stated in their study that Frail and vulnerable older adults oral health needs are complicated by medical, functional, behavioral and situational factors [5]. Homebound elderly that lack physical mobility is unable to travel to dental offices for care, move around their own house, or properly care for themselves. Physical limitations make it difficult for these elderly patients to meet their own basic needs. Homebound elderly who have physical limitations must rely on caregivers and family to meet their needs. Sometimes the caregivers and family members are unaware of the importance of maintaining a good oral health regimen for these patients or are unable to provide adequate care in this area. Sometimes the patients themselves are unaware of the importance to care for their own oral health. In the study done by Gaszynska., *et al.* (2014) the dental hygiene practices of the 259 home care residents was evaluated for proper effectiveness. The study showed that the effectiveness of plaque removal for this cohort was very low. Of those cleaning their teeth and dentures at least twice a day with a toothbrush and fluoride toothpaste, almost

29.5% had an insufficient level of oral hygiene. 25.9% were aware of their own inabilities and asked for help with the task [20]. Physical limitations that reduce the ability to properly perform oral health routines of these individuals must be evaluated by health care providers. Assistance may be required for a significant number of these homebound individuals to maintain good oral health. Support and education for caregivers and family members that are providing services for these homebound elderly patients is recommended. Caregivers and family members should be aware that this cohort desire for care may not match their need for care. In the cross-sectional study done on 259 care home residents Gaszynska., *et al*. (2014) discovered that poor knowledge of and wrong attitudes to oral hygiene, as well as an improper organization of work or insufficient time allocated for oral care, was common among caregivers and nursing staff [20].

Many older adults have limited funds and are unable to pay for preventive oral health care. Financial limitations are a barrier to care that exists among this population. There are no laws that set care protocols for homebound elderly patients that reside in the community in regard to oral health routine. According to the United States Department of Health and Human Services (DHHS) Administration on aging (2015). The major sources of income as reported by older persons in 2013 were Social Security (reported by 84% of older persons), income from assets (reported by 51%), private pensions (reported by 27%), government employee pensions (reported by 14%), and earnings (reported by 28%) [6]. Many members of this cohort are on fixed incomes and are not given the option for in-home dental services. Medicare does not pay for preventive dental care procedures which show limited support from a community network that is needed.

In the study by Ornstein., *et al.* (2015) it was indicated that for oral healthcare professionals to make a difference in the oral health status of homebound elderly, dental students will require additional training working with this population [13]. Yellowitz and Schneiderman (2015) additionally stated that Dental hygiene education must prepare graduates to assume a position in a variety of health care settings not limited to office settings [5].

Ornstein., *et al.* (2015) suggest that geriatric dentistry needs to be viewed as a specialty that requires additional training and expertise. This study showed high unmet oral health needs among the participants regardless of the type or number of medical comorbidities [13]. Yellowitz and Schneiderman (2015) state that the current level of training in dental and dental hygiene programs addresses a minimal level of competency, with little emphasis on the older adult population categorized as special needs in predoctoral dental accreditation standards. The education of dental professionals must change and adapt to meet the unique needs and demands of this vulnerable aging population [5].

There are very few studies that show the impact that oral health care professionals can have on long term oral health status among homebound elderly. A random controlled study was done in a long term care facility to determine the impact that three types of oral health intervention could have to improve the oral health status of participants. Zenthofer, Dieke, Dieke, Wege, Rammelsberg, and Hassel (2013) enlisted one hundred and six participants to determine how effective professional cleaning of teeth and dentures, with individual oral hygiene instruction, can improve oral health over time. The participants were divided into four groups, three therapy groups, and one control group. All three therapy groups teeth and dentures were cleaned professionally and individual instruction was given. One of these groups was additionally instructed by a dentist, one group was instructed by a dental hygienist and the third therapy group had no additional instruction [22]. The research done by Zenthofer., *et al*. (2013) showed that even with additional oral hygiene instruction, the oral health outcomes decreased over time and had no statistical difference if oral hygiene instruction was done by a dentist or a dental hygienist over time [22]. At the same time, if a participant was a member of one of the tree therapy groups the hygiene index improved significantly over time compared with the control group. This study showed how significant the need is for the repeated and routine care of homebound elderly. After three years there was no statistical difference among groups [22]. This study strongly suggests that routine care is the most effective way to help homebound elderly manage their oral health status. Dental hygienists who are properly trained in geriatric care are best suited to meet the needs of this population's oral health needs. Caregivers, dental hygienists, nursing staff, and family members can have an impact on the oral health status of homebound elderly with assistance, education, and motivation for the homebound elderly patients that is provided on a routine basis. Zenthofer., *et al.* (2013) study showed that the routine use of preventive services coupled with oral hygiene instruction can prove to be very beneficial to elderly patients that require assistance [22]. Good oral health can go a long way in providing maximum function, reduced disability, and increased quality of life for homebound elderly.

Discussion

Oral health professionals and care givers need access to homebound patients on a routine basis with deliberate care plans that include oral health practices. Dental Hygienists should be part of a multidisciplinary team that works with these homebound elderly patients directly and indirectly to monitor, perform, and direct care plans that incorporate dental health into the treatment of these patients. Many of these patients have functional limitations that create difficulty in performing adequate self-care. These patients can also have additional cognitive function limitations that make it a challenge for them to remember to care for themselves. Health care professionals should consider these primary limitations when discussing oral health needs and incorporate necessary care into daily treatment plans for these patients [23-28].

Summary and Conclusion

What we know from this research is that our elderly population will continue to grow in size, suffer from multiple chronic diseases, routinely take prescription medications, and most likely retain many of their teeth well into their senior years, if not their whole lifespan.

Summary

We began by looking at the population health status as it relates to oral health. We discussed many of the variables that exist for this population to help explain the poor oral health status that exists, and how it relates to their overall health. Barriers to having access to proper dental care were discussed. The primary barriers included functional limitations, cognitive limitations, lack of understanding of significance of oral health, as well as financial barriers to care were all found to be significant contributing factors.

The research question for a patient that is confined to their home, will access to in-home preventive services by an oral health professional provide the patient with greater oral health comfort?

We started our research by investigating the root characteristics of the population of homebound elderly. We found that this population has been growing at a significant rate, and have a wide variety of health issues that are considerations that should be discussed when considering oral health status. The research showed that we are living longer, keeping our teeth, living with chronic diseases for a greater number of years, and many live with significant functional and cognitive limitations.

We then reviewed the characteristics of the homebound elderly and what type of care they require, who is providing the care, and how much help they have with daily function. The research showed that more than half of homebound elderly rely on family members or caregivers for a great deal of their primary needs, including oral health care. For some homebound elderly there is limited access or ability to provide professional oral health services due to the lack of physical ability to get to a dental facility or withstand a treatment procedure in a dental chair.

The literature review examined the most common types of chronic diseases that this cohort facies including cardiovascular, diabetes, and obesity. Strong correlations of the connection between oral health status and management of these diseases were made. The most common chronic diseases that this population face also have the strongest bidirectional relationship to oral health. In addition to the management of chronic disease, there were strong connections made with functional and cognitive changes that play a role in the management of oral health.

Many homebound elderly face multiple limitations as well as sensory issues that create challenges with care. Visual and hearing impairments can cause challenges for both patients and caregivers in communication and development of routine habits related to oral health home care abilities. Sensory limitations can reduce the ability of homebound elderly patients to properly care for themselves, and challenge their ability to communicate needs to others that are caring for them.

The literature discussed that the most common oral health issue faced by this group is xerostomia. The findings showed that xerostomia is due to age and multiple medications routinely taken by this group. Xerostomia creates many oral health problems for patients and increase the prevalence of discomfort for patients. Edentulous characteristics were also found to be rampant, and many homebound elderly had poorly fitting dentures, no dentures, or dentures that were in need of repair. Untreated dental decay was a significant problem

for this population due to the significant unmet needs of this group. Active Periodontal disease, broken teeth, decayed teeth, and minimal occlusion or retained teeth were the most common problems in this category.

One significant contributing factor to the unmet needs of this population discussed in the literature was patient perception. Patients perception of oral health needs showed that while clinical evaluation of oral health status may have been poor, most members of this group reported good oral health status, when asked. Awareness of oral health problems or understanding of the need for routine care seemed to be misunderstood by this population. A connection was made due to social exposure, life situations, upbringing, and family history of routine dental care.

In addition to the patients perception of need for oral health care, there is a significant need for an increase in knowledge of oral health status and correlation to overall health for care givers, family members and nursing staff. Homebound elderly, in general, is a complex population that require specialized training and understanding of their needs and health situations. Dental health professionals and those that work with this population will require additional training to meet the wide range of needs that this population requires.

Conclusion

The oral health needs of homebound elderly is vast with many unmet primary oral health prevention plans. Many members of this group have limited ability to reach dental professionals for a number of reasons. Homebound elderly will continue to have significant unmet dental needs and will continue to suffer the effects of poor dental health if programs are not put into place to help overcome the barriers that exist. The research shows that the success of oral health is obtained by oral health habits being performed routinely and adequately.

Recommendations for Practice

Currently elderly have no laws or mandates to protect their oral health needs when they are being cared for by others. There should be policy created to protect homebound elderly and provide them with mandates that health care professionals need to meet. The ability to care for homebound elderly oral health needs can only be met if all providers work together and make it a priority to care for these patients oral health. Time should be spent on educating family members on the importance of oral health. Many homebound elderly rely on others for care, therefore, all healthcare providers should be trained in oral health care. Dental hygienists can train in home care givers and family members on proper mouth care. The Dental hygienist should also be part of the team of professionals that oversee the health management of these patients.

Recommendations for Further Studies

Many of the sample sizes in this literature review were small and many were residents of a long term care facility. More research is needed on homebound elderly that reside in their home to develop a greater understanding of how to best meet the needs of this population.

It would be valuable to understand the perception of care givers, nursing staff, and doctors on the topic of oral health. A study that investigates knowledge, understanding, and perception of oral health of the team that treat and manage our homebound populations and how it relates to systemic wellness. Having an in depth understanding of our providers could benefit the dental hygienist when developing a program plan for this population. The more we understand the current situation of the oral health status of our homebound elderly, the more aware we become about the needs that exist. Research to better understand all aspects of homebound elderly care will go a long way at improving the oral health needs of this population.

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