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Oral health in frail elderly

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Summary

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The increasing life expectancy and decreasing birth rate, particularly in the industrialized countries, have resulted in a progressive demographic transformation of the society into a society characterized by an increased proportion of elderly. In 2020, about 40% of the population in the Northern part of the Netherlands will be over 65 years of age. Moreover, the number of people over 80 years will increase to approximately 10% of the population in this area during the next three decades.

Ageing points towards increasing health problems and rising costs for the society. One of these health problems is the deteriorating oral health in care dependent elderly. The latter is related to the high need for care on many levels in these elderly. This high need for care interferes with their activities for daily living such as food intake, drug intake, getting dressed, bathing, general health care and physiotherapy. As a result, less time is reserved for activities that are commonly considered less important by elderly, which unfortunately includes oral care. The lack of attention for oral care can be considered a hidden health hazard as it has been shown that dental awareness and oral health significantly contribute to general health and quality of life (QoL).

Unfortunately, the health hazard accompanying deteriorating oral health is yet not recognized by a significant number of health professionals. Many health professionals do not fully recognize the impact of the lack of attention for oral care or are even not equipped to recognize the neglect of oral health by the elderly. Moreover, even when they recognize the oral health problem, time is usually lacking for the caregivers to perform the needed oral health support as well as that finances are commonly insufficient to efficiently tackle this problem. Therefore, the current lack of attention for oral care can be considered a hidden health hazard as it is presumed that dental awareness and oral health significantly contribute to general health and QoL as well as that the impact of oral status and oral health on general health, frailty and/or cognitive dysfunction in frail elderly is unclear. Therefore, the general aim of this PhD study was to assess oral status and oral health of frail community living and indwelling elderly as well as to assess its impact on general health, frailty and QoL.

When elderly become care-dependent, their oral health usually becomes worse and gets less attention. However, there is sparse knowledge concerning the oral health and oral status of elderly patients newly admitted to a nursing home as well as concerning the need for oral care they need during their stay in the nursing home. Therefore, the oral health, oral status, need for dental care, cooperation with dental treatment and given dental care were assessed by two geriatric dentists in all new long-stay patients (n=725) admitted to a nursing home between January 2009 and December 2013 (Chapter 2). All patients were followed from admission until death or until they left the nursing home.

The results revealed that at admission dementia patients were significantly older than somatic patients, median [IQR] ages were, respectively, 85[79-89] and 81[76-87] years ($p \leq 0.001$). In addition, edentulous patients were significantly older than patients with remaining teeth: 83[79-89] versus 80[74-86] ($p \leq 0.001$) years. Thirty percent of the admitted patients died within 12 months after admission. A small minority (20%) of the patients had their own teeth. In this group, poor oral hygiene (72%), caries (70%) and broken teeth (62%) were frequently observed. Edentulous patients were significantly more cooperative with treatment than patients with remaining teeth (64% versus 27%). Finally, significantly less professional dental care was given to edentulous patients when compared to patients with remaining teeth (median 90 [IQR 60-180] versus 165 [75-375] minutes).

This study showed that when compared to edentulous elderly patients, patients with remaining teeth were younger at admittance, were more often non-cooperative, and had a poorer oral health and higher need for dental care. Thus, it is important that health care workers ensure adequate oral health and dental care to frail elderly especially for elderly with remaining teeth.

Identification of elderly persons at risk for adverse health outcomes based solely on chronic illnesses or age is not advisable because it disregards the considerable inter-individual variation during ageing. Therefore, the concept of frailty has been introduced in geriatric care. Frailty indicates a state of vulnerability regarding the future occurrence of poor health outcomes, such as mortality, hospitalization, institutionalization, chronic conditions and loss of function in one or more domains (i.e., physical, psychological, cognitive, social). Studies have shown that certain individual characteristics, such as socio-economic class, morbidity (physical and psychological), obesity, and formal home care utilization, are associated with higher levels of frailty. These studies, including studies on formal home care utilization, did not include oral status (having own teeth or being edentulous) or oral health status (i.e., presence of periodontal diseases, caries and broken teeth) of community living elderly persons. Consequently, the impact of oral status and oral health on general health, frailty, QoL and/or cognitive dysfunction in this group of elderly remains unclear. Therefore, a study was performed to assess oral health and oral status of care dependent elderly patients who live at their own home (community living elderly) and recently (<6 months) received formal home care as well as to assess the impact of oral status on frailty, general health and QoL (Chapter 3).

Dutch community living elderly persons (≥ 65 years) living in the Groningen county who were recently (<6 months) approved for formal home care (inclusion period from January 2015 until January 2016) and who were physically and/or cognitively able to be interviewed were eligible for this cross-sectional observational study. From all participants oral (health) status, frailty (Groningen Frailty Indicator), cognition (Minimal Mental State Examination), and (oral health related) QoL (RAND 36, Oral Health Impact Profile-14) were assessed. 103 out of 275 consecutive eligible elderly persons (median age 79, IQR 72-85 years) were willing to join the study, of

whom 39 had remaining teeth and 64 were edentulous. Strikingly, compared with edentulous elderly persons, elderly with remaining teeth scored significantly better on frailty, QoL, physical function and general health. No significant differences were seen in cognition, however. Overall oral health was poor, and 69% of the participants no longer visited a dentist for yearly check-ups.

From this study it was concluded that despite their often poor oral health, care-dependent community living elderly with remaining teeth seemed to generally function better than edentulous elderly persons. Most elderly no longer visited their dentist.

While poor oral health in care dependent elderly who are living in nursing homes is well described (Chapter 2) and is usually already poor at admission to nursing homes (Chapter 3), minor knowledge is available regarding the oral status and oral health problems of (frail)elderly living at their own homes (= community living elderly). The few studies yet published on oral health of community living elderly persons suggested that many elderly face oral health problems, but hardly anything is known concerning their oral status (i.e. having own teeth, being edentulous.) and the association of oral status with general health, frailty level and QoL. Therefore, the oral status and self-reported oral health were assessed in community living elderly and associated to their frailty level, general health status and QoL (Chapter 4).

1325 Dutch community living elderly persons (≥ 75 years of age) were asked to complete questionnaires on oral status, oral health/dental care, frailty (Groningen Frailty Index, Katz 15), case complexity (IM-E-SA), general health and QoL (EQ5D). 1026 out of 1325 community living elderly persons completed the questionnaires (response rate 77%; median age 80 years, IQR 77-84 years) of whom 39% had remaining teeth, 51% was edentulous and 10% had an implant-supported overdenture. Complex care elderly were more often edentulous and had more oral problems than robust elderly. Elderly persons with remaining teeth were significantly less frail, used less medicine and had better quality of life. Outcome measures of elderly with implant-supported overdentures resembled most elderly with remaining teeth.

This study showed that QoL is higher, general health better and frailty less among elderly with remaining teeth and implant-supported overdentures as well as that complex care and frail elderly have more oral health problems than robust elderly. Thus, apparently elderly with remaining teeth or implant-supported overdentures are less fragile and have better general and oral health. As oral health problems are most pregnant in complex care elderly, oral care should be safeguarded in elderly health care programs to prevent oral health decline with progression of the frailty status of elderly.

As human live longer, the number of edentulous elderly asking for placement of endosseous implants to retain their mandibular overdenture probably will strongly rise during the next decades. It has been assumed that survival rates for implants

in older and younger adults are comparable, but bone and soft tissue healing after implant placement might become compromised with aging. Additionally, differences in bone to withstand chewing forces might become worse with age as well as that elderly may experience difficulties to continue the high standard of oral care needed to clean the small intraoral superstructure components. Therefore, a prospective comparative study was performed to assess whether age has influence on peri-implant health in patients treated with mandibular 2-implant overdentures during a 10 years' evaluation period (Chapter 5).

The study was carried out in two groups of edentulous patients, viz. a younger (n=52; mean age 45 years, 35-50 years) and an older (n=53; mean age 68 years, 60-80 years) group. In all patients, two dental implants were placed in the interforaminal region of the mandible and after a three-months' healing period overdentures were fabricated. Clinical and radiographic parameters were evaluated immediately after completion of the prosthetic treatment, and after 1, 5 and 10 years. Implant loss, plaque-index, gingival-index, bleeding-index and probing depth were assessed as clinical parameters. Peri-implant bone loss was assessed on dental radiographs made with a standardized long-cone technique with a direction device. The results showed that implant survival after 10 years was 97.1% and 93.4% in the younger and older group, respectively. Ten-years scores of plaque, gingiva, and bleeding were between 0 and 1 for both groups (possible scores 0-3), and mean probing depth was 3 mm in both groups. Mean peri-implant bone loss after 10 years was 1.2 mm and 1.4 mm in the younger and older patients, respectively. No significant differences were observed between the groups.

This study showed that clinical performance of mandibular 2-implant overdentures is equally successful in younger and older patients. In other words, mandibular 2-implant overdentures are also a solution to consider in elderly, even at high age, with lower denture problems.

Implant-supported (partial) dentures may raise problems in patients who have become dependent on others for daily oral health care. Dental hygienists and general dental practitioners, as well as care providers, volunteer aiders and even health care insurance companies, should anticipate the growing demand for specific oral health care for patients provided with implant-supported (partial) dentures. However, even as was shown in Chapter 5 that mandibular 2-implant overdentures perform well in elderly persons, are these implant-supported overdentures indeed a solution for care dependent elderly?

In chapter 6.1 three cases are described discussing issues that have to be considered in care dependent elderly with denture problems. Analysis of these three cases revealed that, when considering implant treatment in care dependent elderly, the following questions should be raised: (1) Is the treatment appropriate in contributing to the patient's well-being and quality of life? (2) Is the treatment the most suitable treatment? (3) Does the treatment integrate with the patient's oral health

care plan? (4) Is the patient sufficiently cooperative? (5) Is the patient supported by a well-functioning oral (self) care assisting network? and (6) Is it possible for the patient to regular see an oral health care professional and is oral health care easily accessible in cases of an emergency?

The common conclusion from **Chapter 6.1** was that indeed dental implants are a good solution to solve lower denture problems in fragile elderly in case that the answer on the raised questions is affirmative. However, this applies to the current implant systems. In the early implant era, transmandibular implant systems were used for retention of implant-supported mandibular overdentures in the severely resorbed mandible. These transmandibular systems require very thorough aftercare, especially when patients become frail and dependent on care. As shown in **Chapter 6.2**, when oral care receives less attention, which is rather common in frail elderly patients or the patient cannot maintain the needed level of oral care, the patients can be posed to severe complications, including chronic pain and fracture of the mandible. This phenomenon poses a significant risk in daily practice, as care providers often are unfamiliar with the level of oral care needed to preserve transmandibular implants in good condition. Fortunately, as these implant systems are no longer in use, the number of elderly still alive with transmandibular implants systems will rapidly decline.

In the general discussion (**Chapter 7**) the impact of the studies described in **Chapters 2 to 6** and **Appendices A, B and C** is discussed and placed in a broader perspective. Recommendations for the oral care in care dependent elderly are provided as well as that recommendations are given as how to better organize the oral health care for care dependent elderly in the Netherlands.

As the results of the research described in this PhD thesis are very relevant for the Dutch general dental practitioners, in the **appendices** the results of three studies are summarized that are published in the *Nederlands Tijdschrift voor Tandheelkunde* (Dutch Dental Journal of Dentistry). These studies provide some insight into the oral care level and needs of Dutch (care dependent) elderly as well as studies discuss how well the 'Guidelines for oral care for patients dependent on care in nursing homes' are implemented in Dutch nursing homes.

When people grow old and dependent on care, it usually becomes increasingly difficult to maintain oral health. The aim of the study described in **Appendix A** was to assess what changes have taken place during the last ten years in oral health and the need for dental care among patients who were admitted to a nursing home between 2002 and 2012. Results revealed that the number of patients with remaining teeth increased significantly, from 7.9% to 28.7%, and that the number of patients with implants increased from 0.0% to 3.2%. More than 80% of the patients had moderate to poor oral health upon arrival. Moreover, almost half of the patients were revealed to be non-cooperative for evaluation and/or treatment, especially those who had remaining teeth. The expectation is that as a result of the increas-

ing number of care-dependent elderly with remaining teeth in combination with poor oral health, the demand for dental care for care-dependent elderly in nursing homes will increase sharply in the coming years.

Implant-supported mandibular overdentures are commonly applied in the Netherlands. There is, however, insufficient information on how these elderly people are functioning with their overdenture and on their peri-implant health. Therefore, a study was carried out among a group of people aged 75 and over who had been provided with an implant-supported overdenture in a general dental office, measuring their ability to manage independently, their general health and peri-implant health (**Appendix B**). The study revealed a high degree of ability to manage independently, despite the health problems affecting many over 75. The patients rated their prosthetic overdentures with an average grade of 8.9 ± 1.1 . Plaque around the implant (73%) and bleeding on probing (68%) were frequently seen. However, progressive peri-implant bone loss was seldom seen. No relationship was evident between plaque-scores and the ability to manage independently. Except for oral hygiene instruction and/or professional cleaning of peri-implants, no serious interventions were necessary. Thus elderly people, provided with an implant-supported mandibular overdenture, are usually functioning well. Plaque around the implant and bleeding on probing are often present, but progressive peri-implant bone loss is rare.

It is known that 75% of older people being admitted to a nursing home in the Netherlands are found to have oral care problems that have not been treated. Moreover, the Dutch Healthcare Inspectorate reports that oral care for patients who depend on care in nursing homes is inadequate. The 'Guidelines for oral care for patients dependent on care in nursing homes', developed in 2007, are probably inadequately implemented. Therefore, it was assessed how these guidelines were implemented in healthcare organizations (**Appendix C**). To that end, a questionnaire was distributed among the staff of 74 Dutch nursing homes. An analysis of the data revealed that people are familiar with the guidelines and that oral care providers are often available. Oral care providers, however, often do not have access to reasonable dental care facilities. Patients are, moreover, generally not screened and/or monitored in accordance with the guidelines. Finally, it seems that overall nurses and care-providers do not receive sufficient training in oral care for clients. Thus, although the nursing home staff is well-acquainted with the 'Guidelines for oral care for patients dependent on care', its implementation in daily practice leaves much to be desired.

