Discontinued dental attendance among elderly people in Sweden

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Abstract

Aim: Our objective was to study the loss of dental attendance and a possible age trend among patients aged ≥65 years in Sweden. Regular dental check-ups are considered to be an important factor in maintaining oral health. Approximately 80% of the adult population in Sweden are enrolled in a regular check-up system; however, dental practitioners often find that older patients attend fewer check-ups. Old people may naturally lose contact with dental services as they move to special housing or die. In this systematic study, these factors were investigated and used as exclusion criteria. Materials and Methods: Data were collected for all patients (n = 4759) aged 65 or older from the electronic journal system in 3 large public dental clinics in 3 communities. Their dental records for the years 2004–2009 were studied longitudinally by 1 person at each clinic; 1111 patients were excluded (patients died during study period, wanted emergency care only, obtained special dental care allowance, moved from the community or moved to special housing, or left the clinic for another caregiver). The statistical analyses were performed using the Statistical Package for the Social Sciences version 21 (IBM). Results: Of the 3648 patients (1690 men and 1958 women) included in the study, 13% lost contact with their dental service over the course of the study (10% of those were aged 65–79 and 21% ≥80). The decrease in regular dental contact had a statistically significant association with increasing age (P < 0.001). Conclusion: A considerable number of older people living independently or with moderate supportive care in their own homes lost contact with dental service despite enrolment in a recall system.

Key words: Dental attendance, dental care for aged, frail elderly, public dental service

INTRODUCTION

As a group, older people are steadily increasing in both numbers and proportions in most countries. Approximately 600 million people worldwide are now aged 60 or older—a number estimated by the World Health Organisation to double by 2025.¹ This global trend is also seen in Sweden, where the current population of 1.6 million people aged 65 years or above is projected to increase to 2.2 million by 2025.² The majority of older people in Sweden live independently, however, increasing numbers of those living at home are frail and dependent on daily help from others.³⁻⁶

Approximately 80% of the adult population in Sweden are enrolled in a regular dental check-up system, of which...
the Public Dental Service manages 42%. Treatment is not free of charge, but the national health insurance covers a certain amount of the expenses. There is also a special dental care allowance for older people receiving substantial supportive care for daily living in their homes or at institutions. Under this special dental care allowance, the maximum fee for the elderly is SEK 1100 per year (€ ≈115). Approximately 6% of the inhabitants aged 65 years and older in the study region are eligible for this special dental care allowance.

Oral health patterns have changed as increasing numbers of older people retain their own teeth, many of which are heavily restored. Older people have an increased risk of developing oral health-related problems, due to impaired saliva secretion associated with medication, changes in dietary habits, and difficulties in managing at-home dental care. Thus, providing adequate dental care for older people is a considerable challenge for the dental community. Caring for and helping older people maintain good oral health will require special competence and occupy more of the dental team’s time. Regular dental check-ups, preventive measures, home care, and dental care are important to maintaining good oral health. Many dental clinicians report that their older patients lose contact with their dental service, commonly cancelling or failing to appear for scheduled appointments. A study by Strömberg et al. concluded that of the several factors associated with the risk of developing caries among homebound elderly people on moderate or substantial supportive care, one of the most important was not having a dentist. Lack of contact with dental services has also been observed on the admission of older people to nursing homes. A study from France in 2000 reported that over 70% of newly admitted residents had not seen a dentist for over 5 years.

The main aim of this study was to examine to what extent older people enrolled in a regular dental check-up system lose contact with their dental health service. One additional aim was to record dental status and the use of medication in a subsample of the study group to illustrate the oral and physical health of the study group and compare it with the national figures to be able to comment on the representativeness of the sample. Our hypothesis was that contact with dental health services decreases with increasing age.

**MATERIALS AND METHODS**

Data from electronic dental journals were collected from three public dental clinics in the Region Västra Götaland, Sweden. Region Västra Götaland, situated on the Swedish west coast and inlands, is the largest county council in Sweden, with a population of 1.6 million, and its mix of urban and rural areas, small communities, and major cities mirrors that of Sweden as a whole. The three selected communities represent both rural and suburban areas. Two of the communities are fairly small, with approximately 10000 inhabitants each, and are situated approximately 200 km from the county’s main city, Gothenburg. The third community has 25000 inhabitants and is considered a suburb of Gothenburg. The population of the suburb with 19% aged over 65 years is somewhat younger than that of the two smaller communities, each with approximately 25% of the population aged over 65. Each community has one or more private dental surgeries and one public dental clinic serving the adult population.

Patients included in this study were all enrolled in a dental-recall system at the three selected public dental clinics and were invited for a dental check-up according to their estimated need and individual demand. The study group were aged 65 or older and were living independently or with moderate supportive care for daily living in their own homes. The recall system ensures that patients are scheduled and contacted by the clinic by telephone or post for dental check-ups at least every second year. If the patient declines the invitation or fails to attend the scheduled appointment, it is noted in the record. It is also noted when patients move from the area or choose another dental caregiver. In Sweden, information about whether patients have moved or died is available from the regional population registry that is cross-linked with electronic dental records and is updated on a regular basis. These records are maintained according to the standards of the National Board of Health and Welfare.

To be included in the main study, patients had to be 65 years or older in 2009. Excluded from the study were those who

- had died during the study period;
- wanted emergency care only;
- obtained or during the study period became eligible for the special dental care allowance subsidized by the county council (because such dental care includes a free annual in-home examination by a dental hygienist);
- lived in or moved to a nursing home during the study period because all residents of nursing homes are entitled to the special dental care allowance;
- had moved from the community and/or left the clinic for another caregiver during the study period.
Individual data from dental records during 2004–2009 for 4759 patients were examined longitudinally by one person at each clinic (two dentists and one dental hygienist). The selected patients were ≥ 65 years old at the beginning of the study in 2009. The three examiners were trained to use the same protocol at each clinic. After application of exclusion, the dental records of 3648 participants (1690 men and 1958 women) were included in the study (small community 1, n = 912; small community 2, n = 754; suburb, n = 1982). Table 1 shows the distribution of age and sex.

The data from the dental records noted in the protocol were age, gender, and active (at least three examinations in the study period) versus nonactive (at least three declined visits) patient status. The five different criteria for exclusion were also noted.

To gain an overview of the sample and its representation of the population, a subsample of 1102 patients was randomly chosen from the different age groups in the main sample of 1982 patients from the largest clinic. Randomization was conducted by selecting every second individual in each age group, other than the oldest group, from a printed list. Because there were fewer participants in the oldest age group, all participants were included. The records from the subgroup were analyzed according to the number of teeth, dentures, implants, medication status, and loss of regular attendance. These data were collected from the last registration in the individual dental records in the study period 2004–2009. In the two small communities these data were not collected.

The Regional Ethical Review Board of Gothenburg approved this study (decision number 402-10).

**Data analyses**

Data analyses included descriptive statistics and Chi-square linear-by-linear test. The linear-by-linear association test was used to test for trends. P < 0.05 was considered statistically significant. The statistical analyses were performed using the IBM SPSS Statistics for Macintosh, Version 21.0. Armonk, NY: IBM Corp. USA.

**RESULTS**

A clear association between age and loss of regular dental attendance was found among patients aged 65 years and older ($\chi^2 = 114.0, P < 0.001$) [Figure 1]. Between 2004 and 2009, 13% of the participants lost contact with the dental health service (10% in those aged 65–79 and 21% in those ≥80).

Table 2 shows dental status, use of medication, and loss of regular dental attendance in the subsample. An average of 17.8 remaining teeth and 3.8 prescribed medicines were found. Seven percent of the participants had implants and 6.4% had a full denture in one or both the jaws. In total, 12% of the subsample had lost contact with dental services during the study period.

**DISCUSSION**

This study shows that the proportion of older people who lose their regular contact with dental services increases with age. This is in line with both the reported experience of dental staff and data from other studies. It may seem natural that old people lose contact with dental services as they move to special housing or die. In this systematic study, such factors were treated as exclusion criteria and only those people still living in their own homes, with or without help, were included. To our knowledge, this is the first study to systematically investigate dental attendance in a large sample of older people.

Our finding of a clear relationship between age and an increasing tendency to lose a formerly regular pattern

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**Table 1: Distribution of participants according to age group and sex in the study sample**

| Age group | Women | Men | Total |
|-----------|-------|-----|-------|
|           | n     | %   | n     | %   | n     |
| 65-69     | 633   | 52.4| 575   | 47.6| 1208  |
| 70-74     | 438   | 51.4| 414   | 48.6| 852   |
| 75-79     | 340   | 51.2| 324   | 48.8| 664   |
| 80-84     | 266   | 54.2| 225   | 45.8| 491   |
| 85-89     | 203   | 64.0| 114   | 36.0| 317   |
| ≥90       | 78    | 67.2| 38    | 32.8| 116   |
| Total     | 1958  | 53.7| 1690  | 46.3| 3648  |

**Figure 1:** Distribution of participants who had lost contact with the dental health service during the study period according to age group (n = 3648)
People who live alone are more likely to have fewer teeth and more anterior tooth spaces. The strength of this study is that earlier in life all the participants had chosen to enrol in a dental care system with regular recall. In Sweden, approximately 80% of the adult population visit the dentist with some regularity. From this, we can assume that the participants had reasonably regular visits throughout most of their adult lifespan.

A limitation of the method of a retrospective study of patient records is that over time many different people may have been involved in writing the records. Despite guidelines for maintaining consistent records, it is difficult to know how well all contributors conformed to those guidelines. However, prior to the start of the study all three investigators were trained to fill in the protocol based on what was found in the records, so we can expect a consistent interpretation of the records across the three clinics.

The representativeness of the study sample also bears some discussion. The sample was drawn from smaller communities, all located in the same county in western Sweden, but fairly well correlated with the national population distribution. The study group of 65 years and older represented 25% of the population in the two smaller study communities and 19% in the largest. The corresponding figure is 18% for Västra Götaland and 19% for Sweden as a whole. The proportion of older people is generally slightly lower in larger towns and cities than in smaller municipalities.

To gain information about representativeness, a subsample of the main sample were randomly selected.
and their dental records examined for number of teeth, dentures, implants, medication status, and loss of regular attendance. These data were collected from the last registration in the individual dental records during the study period 2004–2009. Patients in our subsample had an average of 20 teeth. According to the National Board of Health and Welfare, people aged 60–90 in Sweden have an average of 21 remaining teeth.[28] Seven percent of our subsample had one implant or more, a proportion quite similar to the national figure of 5%.[29] Thus, the patients in our study correlated quite well with the elderly population of Sweden or parts of Sweden with regard to number of teeth and implants. Six percent of our subsample had a full denture in one or both jaws. In a repeated cross-sectional study of the population in a Swedish county, the proportion of totally edentulous 80-year-old individuals had decreased from 56% in 1983 to 5% in 2003 and even lower in 2013.[30]

The subsample had an average of 3.3 prescribed medicines. The corresponding figure for Sweden is 5 to 6 medicines for the group 75 years and older.[31] A recent study[19] showed that elderly people (75 years and older) dependent on moderate and substantial supportive care used approximately six medicines, but our study group was somewhat younger, and in general probably healthier because substantial supportive care was a criterion for exclusion.

The findings of this study showing a clear relationship between age and an increasing tendency to lose a formerly regular pattern of dental contact support the results of telephone interviews collected by the Living Conditions Survey (SCB Statistics, Sweden), which showed that people aged 16 years and older reported declining regular dental contacts with increasing age.[32] The ability of old people to maintain contact with their dental health service seems, therefore, often to be reduced. Patient age is therefore an important indicator to consider in the planning of the oral health care system.

Lack of dental contact is likely to escalate the risk of oral health problems, which, in turn, may have negative consequences for patients' quality of life during their later years.[33,34] The frail period of life probably coincides with the time of not seeing the dentist, developing impaired saliva secretion due to medication, changes in diet, and difficulties in oral hygiene, which can result in the rapid deterioration of their dental status and have a significant impact on their oral health-related quality of life.

**CONCLUSION**

It is very important for older people, dental services, and society as a whole to preserve the good oral health that has been established through a lifetime of regular dental care. The result of the present study shows, however, that a considerable number of older people living independently or with moderate supportive care in their own homes lose contact with dental service despite enrolment in a recall system. In future studies, it will be important to identify the reasons why older adults lose contact with the dental health service. Knowing these causes may enable us to develop methods to identify individuals at risk of losing contact with the dental health service and develop procedures to ensure regular dental contacts.

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**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. Petersen PE, Yamamoto T. Improving the oral health of older people: The approach of the WHO Global Oral Health Programme. Community Dent Oral Epidemiol 2005;33:81-92.

2. Statistics Sweden. Folkmängdel 1860-2009. Available from: www.scb.se.

3. Larsson K, Thorlund M. Old people's health. Scand J Public Health Suppl 2006;67:185-98.

4. Chatterji S, Byles J, Cutler D, Seeman T, Verdes E. Health, functioning, and disability in older adults? Present status and future implications. Lancet 2015;7:385:563-75.

5. Fure S. Ten-year incidence of tooth Loss and dental caries in elderly Swedish individuals. Caries Res 2003;37:462-669.

6. Avlund K, Holm-Pedersen P, Morse DE, Vitanen M, Winblad B. Tooth loss and caries prevalence in very old Swedish people: The relationship to cognitive function and functional ability. Gerodontology 2004;21:17-26.

7. The Swedish Social Insurance Agency. Social Insurance Report (In Swedish) 2012:10, ISSN 1654-8574.

8. Ordell S. Organisation and management of public dental service in Sweden. Past, present and future. Swed Dent J Suppl 2011;210:10-92.

9. Holm-Pedersen P, Vigild M, Nitschke I, Berkey DB. Dental care for aging populations in Denmark, Sweden Norway, United Kingdom, and Germany. J Dent Educ 2005:69:987-97.

10. About the Swedish Public Dental Service. Available from: http://www.folktandvarden.se/in-english/about-the-swedish-public-dental-service/Statistics, Region Västra Götaland (In Swedish) www.vgregion.se (intranet). [Last accessed on 2016 Apr 09].

11. Österberg T, Carlsson GE, Sundh V. Trends and prognoses of dental status in the Swedish population: Analysis based on interviews in 1975 to 1997 by Statistics Sweden. Acta Odontol
12. Unell L, Johansson Å, Elkbäck G, Ordell S, Carlsson G. Dental status and self-assessed chewing ability in 70- and 80-year-old subjects in Sweden. J Oral Rehabil 2015;42:693-700.
13. Department of Health, United Kingdom. Meeting the challenges of oral health for older people: A strategic review. Gerodontology 2005;22:3-48.
14. Komulainen K, Ylöstalo P, Syrjälä AM, Ruoppi P, Knuttila M, Sulkava R et al. Determinants for preventive oral health care need among community-dwelling older people: A population-based study. Spec Care Dentist 2014;34:19-26.
15. Stein P, Aalboe J. Dental Care in the Frail Older Adult: Special Considerations and Recommendations. J Calif Dent Assoc 2015;43:363-8.
16. Montini T, Tseng TY, Patel H, Shelley D. Barriers to dental services for older adults. Am J Health Behav 2014;38:781-8.
17. Strömberg E, Holmen A, Hagman-Gustafsson ML, Gahre P, Wårdh I. Oral health-related quality-of-life in homebound elderly dependent on moderate and substantial supportive care for daily living. Acta Odontol Scand 2013;71:771-7.
18. Frenkel H, Harvey I, Newcombe R. Oral health care among nursing home residents in Avon. Gerodontology 2000;17:33-8.
19. Hoben M, Kent A, Kobagi N, Yoon MN. Effective strategies to motivate nursing home residents in oral healthcare and to prevent or reduce responsive behaviours to oral healthcare: A systematic review protocol. BMJ Open. 2016;6:e011159.
20. National Board of Health and Welfare. Socialstyrelsens föreskrifter om informationshantering och journalföring i hälso- och sjukvården. SOSFS 2008:14 (In Swedish).
21. Ettinger RL, Beck JD. Geriatric dental curriculum and needs of the elderly. Spec Care Dentist 1984;4:207-13.
22. Ståhlnacke K, Unell L, Söderfeldt B, Elkbäck G, Ordell S. Self-perceived oral health among 65 and 75 year olds in two Swedish counties. Swed Dent J 2010;34:107-19.
23. Lanto A, Lundqvist R, Wårdh I. Tooth Loss and Prosthetic Treatment in Dependent and Functionally Impaired Individuals with Respect to Age and Gender. Int J Prosthodont 2016;29:68-70.
24. Ettinger RL, Beck JD. The new elderly: What can the dental profession expect? Spec Care Dentist 1982;2:62-9.
25. Ettinger RL. Attitudes and values concerning oral health and utilisation of services among the elderly. Int Dent J 1992;42:373-92.
26. Avlund K, Holm-Pedersen P, Morse DE, Viitanen M, Winblad B. Social relations as determinants of oral health among persons over the age of 80 years. Community Dent Oral Epidemiol 2003;31:454-62.
27. Hanson BS, Liedberg B, Öwall B. Social network, social support and dental status in elderly Swedish men. Community Dent Oral Epidemiol 1994;22:331-7.
28. The National Board of Social Welfare. Innehåll och kvalitet i tandhälsoregistret – Juli 2008–december 2009. (In Swedish). Available from: http://www.socialstyrelsen.se/publikationer2010/2010-6-7 [Last accessed on 2013 Aug 19].
29. Österberg T, Carlsson GE. Dental state, prosthetic treatment and chewing ability a study of five cohorts of 70-year-old subjects. J Oral Rehabil 2007;34:553-9.
30. Norderyd O, Koch G, Papias A, Köhler AA, Helkimo AN, Brahme CO et al. Oral health of individuals aged 3-80 years in Jönköping, Sweden during 40 years (1973-2013). II. Review of clinical and radiographic findings. Swed Dent J 2015;39:69-86.
31. Swedish Council on Technology Assessment in Health Care. How can drug consumption among elderly be improved? (In Swedish) En systematisk litteraturöversikt. Statens beredning för medicinsk utvärdering. Stockholm (SBU); 2009. SBU-rapport nr 193. ISBN 978-91-85413–27-0.
32. Statistics Sweden. Tandhälsa och tandvårdsutnyttjande 1975-1999. (In Swedish) ISBN: 91-618-1093-2.
33. McGrath C, Bedi R. The importance of oral health to older people's quality of life. Gerodontology 1999;16:59-63.
34. Rouxel P, Tsakos G, Chandola T, Watt RG. Oral health — A neglected aspect of subjective well-being in later life. J Gerontol B Psychol Sci Soc Sci. 2016; pii: gbw024 [Epub ahead of print].