

ORIGINAL REPORT: QUALITATIVE RESEARCH

Factors Affecting Older Persons' Ability to Manage Oral Hygiene: A Qualitative Study

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Abstract: *A great challenge for the dental service is to support the growing group of elderly people with preserving good oral health throughout their lives. Limitations in the ability to manage oral hygiene and an increased number of risk factors are often reflected by poor oral health. Thus, the need for individualized support and oral health procedures based on the older person's condition is significant. Deficiencies in the motor skills needed to manage oral hygiene are well known, but other factors that affect the ability are not well studied. The aim of the present study was to identify factors that may affect an elderly person's ability to perform oral hygiene self-care, which is the first step to develop a more comprehensive "oral hygiene ability index." The design of the study was qualitative. Data were collected from 4 focus group interviews with a total of 23 participants. Three of the groups consisted of dental hygienists, occupational therapists, and assistant nurses, all working with elderly persons. The fourth group*

was made up of elderly people (72–89 years). Content analysis was used to analyze the data. The latent content was formulated into the core category, "oral hygiene—a complex activity." Three categories emerged: "psychological," "environmental," and "functional" dimensions. The psychological dimension described attitude/motivation, emotions, and cognitive factors. The environmental dimension included practical conditions and social context. The functional dimension dealt with bodily and oral function as well as the senses. In conclusion, self-care with respect to oral hygiene is a complex activity for elderly persons and includes a large number of factors. These factors should be taken into consideration when developing a future oral hygiene ability index.

Knowledge Transfer Statement:

Various factors may affect the ability to manage oral hygiene self-care. Impaired ability to manage oral hygiene, in combination with an

increased number of risk factors, often results in deteriorating oral health and impaired quality of life in older persons. Factors necessary to manage oral hygiene were identified in a qualitative study of dental hygienists, occupational therapists, and assistant nurses, all working with elderly patients, and a group of elderly persons. The results of this study may be important for clinical oral health work with older patients and for the planning of oral health and social care interventions for the growing group of older people.

Keywords: aged, oral health, ability for self-care, risk, qualitative research, focus groups

Introduction

The oral health of the elderly in Sweden and globally has changed in recent decades (Petersen and Yamamoto 2005). In Sweden today, elderly people retain most of their own teeth for life (Norderyd et al. 2015). Their teeth are

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often heavily restored and equipped with technically complex structures that place great demands on the ability to perform daily oral hygiene (Lewis et al. 2015). Normally, the anatomical conditions in the mouth change with age—for example, through attachment loss, leading to exposed root surfaces and altered proximal anatomy, which increase the difficulty to maintain effective oral hygiene (Edman et al. 2012). It has also been shown that, in a normal population, the deterioration in fine motor skills with age may limit the ability to perform oral hygiene (Dayanidhi and Valero-Cuevas 2014).

General health and oral health are important for quality of life (Strömberg et al. 2013). General diseases and a high intake of medication may affect the mouth and teeth, and poor oral health may, in turn, affect a person's general health (Johnston and Vieira 2014). Associations have been reported between oral and general health, such as heart disease, stroke, and diabetes, and become more apparent with increased age (Cesari et al. 2003). Furthermore, aspiration of oral secretions, including bacteria, is an important factor in pneumonia in critically ill patients (Abe et al. 2006). Poor oral health may lead to impaired quality of life due, for example, to pain, poor dental aesthetics, chewing problems, or unpleasant breath. This may lead to avoidance of social contacts, both with the family and with society in general (Hanson et al. 1994; Scully and Greenman 2012).

A great challenge for the dental service is to provide support for the growing group of elderly people in maintaining good oral health, despite the increased risk of oral disease. Effective and appropriate preventive measures like oral hygiene are essential to meet this challenge (Peltola et al. 2007).

Oral hygiene self-care is defined as the ability to remove independently soft coatings from tooth surfaces with appropriate oral hygiene aids and to self-administer and use, for instance, sodium fluoride or antiseptic solutions. The ability for self-care with respect

to oral hygiene often deteriorates with age and is also affected by many other factors that are not yet well understood. The combination of a lack of ability to manage oral hygiene and an increased number of risk factors, such as saliva-inhibiting drugs, dietary changes, and decreased oral motor function, often leads to poor oral health in the elderly person (Närhi et al. 1992; Andersson et al. 2002; van der Putten et al. 2014). Thus, the need for individualized support and preventive measures is significant.

Old people are a heterogeneous group (Ettinger 1993), and the ability to perform oral hygiene differs considerably between individuals. To assess older people's ability to cope with their daily life, different activity of daily living (ADL) indices have been developed and are used in nursing care (Ingemansson et al. 2002). None of these ADL indices include the "ability to manage oral hygiene" as an assessment criterion. Indices that have been developed in dentistry mostly focus on the effect of oral hygiene and on measuring plaque (Greene and Vermillion 1964; Podshadley and Haley 1968; Martens and Meskin 1972). Three indices are currently available to assess an individual's ability to manage oral hygiene, all mainly focusing on motor skills (hand function): the Toothbrushing Ability Test (Felder et al. 1994), the Activities of Daily Oral Hygiene Index (Bauer 2001), and the Oral Hygiene Performance Test (Doherty et al. 1994). Hence, an instrument with more aspects than motor skills is needed to assess the ability to perform oral hygiene. Knowledge about what factors affect the ability to manage oral hygiene is essential to create such an instrument. Thus, the aim of the present study was to identify the factors that may affect an elderly person's ability to perform oral hygiene self-care.

Material and Methods

Study Design

The study design was chosen on the basis of the research question, "What factors affect an older person's ability

to manage oral hygiene?" To gather the participants' thoughts and experiences about the research question, an inductive qualitative approach was chosen, based on focus groups with semistructured interviews and followed by content analysis. A qualitative method using an interview technique to collect data describes the participants' perceptions in their own words (Malterud 2014). These perceptions are at the core of the objective of the study and allow the subjects to express their thoughts and experience by speaking to them directly. The discussion helps to address the research question at a deeper level than quantitative methods.

The focus group methodology uses the group dynamic and is based on the idea that by listening to the opinions of others, insights will be gained and the personal viewpoints can thereby be formed or clarified (Kreuger and Casey 2008). This method can help to explore the participant's own views, which may be difficult to express in an individual interview (Kitzinger 1995). The focus groups in this study discussed factors of importance for how to manage oral hygiene among older people in a broad perspective and from different viewpoints.

The study complied with the Helsinki Declaration (World Medical Association 2013). In the invitation letter, the participants were informed that participation was voluntary, that they could withdraw from the study at any time, and that confidentiality was guaranteed in the processing of data. On the day of the interview, each participant also received this information verbally and signed a consent form. The study was approved by the Regional Ethical Review Board in Gothenburg (reg. no. 158-14).

Sample

The study was performed in Gothenburg and its vicinity on the Swedish west coast. The participants were either elderly individuals themselves or worked with elderly individuals. The participants were

Table.

Characteristics of the Focus Group Participants ($n = 23$).

Focus Group	Age, y		Years in Profession		Sex
	Mean	Range	Mean	Range	
Dental hygienists ($n = 5$)	46	33–58	18.8	7–33	All female
Assistant nurses ($n = 6$)	51	40–64	21.8	13–30	All female
Occupational therapists ($n = 5$)	48	37–62	19.0	13–26	All female
Elderly persons ($n = 7$)	80	72–89			5 women 2 men

strategically selected to capture the heterogeneity and diversity of perspectives in the focus groups.

Four focus groups with 5 to 7 persons in each group, 23 participants in total (Table), were interviewed. The participants in the 4 focus groups were as follows:

1. Dental hygienists, working in public dental care clinics and in specialized dental care
2. Assistant nurses, working in geriatric special housing and/or housing for people with dementia
3. Occupational therapists, working in geriatric medicine wards and stroke wards
4. Elderly persons, attending a community center

In Sweden, *dental hygienists* are the dental staff members who work closely with elderly patients and focus on preventive work, such as oral hygiene procedures. They are often responsible for the regular oral health examinations performed within the Swedish dental service and for examinations of elderly patients at nursing homes and hospitals. *Occupational therapists* are experts on the ADL indices used in health care; for example, they meet patients after a stroke to evaluate ADL and to decide about rehabilitation. Oral hygiene self-care is often a part of the ADL assessment but not in a structural way. *Assistant nurses* work closely with elderly persons, both in nursing homes

and in home care services, and are also included in the rehabilitation team. They often support the elderly with oral hygiene when they have difficulties performing tooth-brushing or other procedures themselves.

The inclusion criteria for the 3 occupational groups of dental hygienists, assistant nurses, and occupational therapists specified that they should work mainly with older people and have at least 5 years in the profession. For the group of *elderly individuals*, the inclusion criteria were age older than 70 years, cognitively healthy, and not having aphasia or major problems with hearing. The inclusion criterion of 70 years or older was chosen as, at this age and older, risk factors such as illness, medication, and problems with dry mouth and changes in social life often appear. The senior participants were part of a larger group that meets every week at a meeting point for elderly people in the community. Of the 7 participants, one had had a mild stroke and one had a Parkinson diagnosis. Individuals willing to attend volunteered and were selected by a health worker if they fulfilled the inclusion criteria.

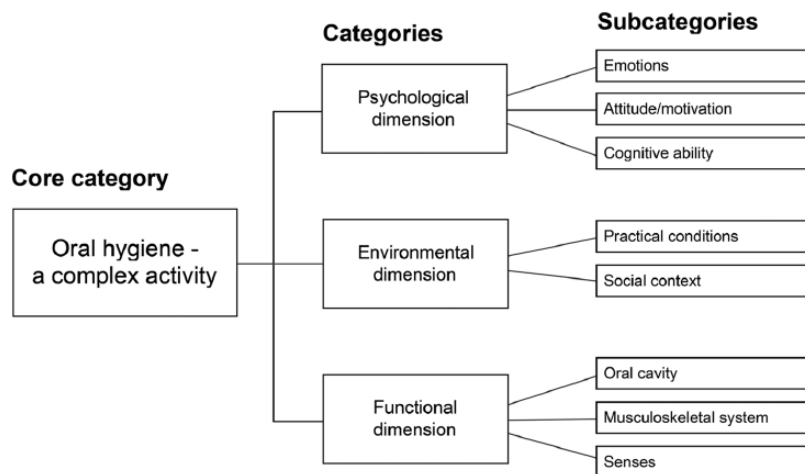
The participants were informed orally about the study, by the team leader at the workplace, the health worker (the senior participants), or the research team, and asked to participate in the focus group interview. This was followed by a written invitation to each participant. All those invited participated, except 1 occupational therapist who declined the invitation due to illness (Table).

Procedure

All interviews were held between February and June 2014, at a place known to the participants. The first author (I.G.L.) carried out the interviews as the moderator. The discussions in the groups started with an explanation of how the group discussion would be carried out. It was made clear that factors other than motor skills were the main issue. After this introduction, the discussion was initiated with the following research question: "What factors affect an older person's ability to manage oral hygiene?" An interview guide developed by the authors, including follow-up questions appropriate to the theme, was used. The follow-up questions were asked during the interviews if answers were not given spontaneously. When the participants raised new thoughts, they were followed up by in-depth, probing questions, such as "How did you feel then?" or "Can you give an example?" to obtain as much information as possible. The interviews were conducted as a conversation. The second author (C.H.) participated as an observer in all interviews.

The participants were encouraged to discuss freely, and all the participants were active and engaged in the discussions. The interviews lasted approximately 60 min and were tape-recorded. The complete recorded interviews were transcribed verbatim within 1 wk. One of the authors (I.G.L.) quality-controlled the transcripts by listening to the tapes and comparing

Figure 1. The experience and perceptions in the focus groups about factors that affect an older person's ability to perform oral hygiene.



with the transcripts. The focus group interview with the dental hygienists was performed first and served as a pilot study. The pilot study turned out well, and no further changes to the study design were required. After reading the interview transcript, it was decided that it would be included in the data analysis, as the interview questions worked well and the discussion about the research question provided rich material.

Analysis

Qualitative content analysis was used to analyze the data. Content analysis is defined by Hsieh and Shannon (2005) as “a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns.” A conventional manifest and latent content analysis was applied to provide interpretation of the text material (Graneheim and Lundman 2004). The latent analysis identified the latent meaning and the manifest content obvious components of the text.

The data analysis was carried out by 3 of the authors (I.G.L., C.H., and P.A.) in several stages. First, the authors read the text carefully and independently several times to comprehend what the participants in the focus groups expressed and to gain an overall understanding of the data. These preliminary thoughts and reflections

were recorded in the margins of the text and discussed by the authors several times. With the research question in mind, meaning units were identified by organizing statements with the same content into different groups. The meaning units were checked and critically analyzed, and comparisons were made regarding similarities and dissimilarities to obtain a deeper understanding of the text. Meaning units were condensed while preserving the core. To enable sorting of the material, subcategories were created and linked together into categories expressing the manifest content. The statement “not been careful with their teeth before,” for example, led to the code “experience,” which became a part of the subcategory “attitude/motivation” and the category “psychological dimension.” The statement “could not raise the arms higher” led to the code “muscle strength” and became a part of the subcategory “musculoskeletal system” and, finally, the category “functional dimension.” Finally, the latent context formulated the underlying meaning into a core category. The 3 authors compared and critically discussed their individual analyses together throughout the analysis process.

Expert Group

To ensure that the categories and subcategories from the focus groups were relevant and to gain credibility, an

expert group was used (Graneheim and Lundman 2004). The group consisted of 9 senior staff members. In the expert group, odontology was represented by 2 dentists and 2 dental hygienists with long experience of dental care for the elderly. One of the dental hygienists and one of the dentists had a wide experience of research. Psychology was represented by a senior psychologist and researcher, with extensive experience from working with dental anxiety and pain. One occupational therapist attended the expert group as a senior researcher with experience of ADL instruments as a field of research. In nursing care, 3 researchers participated from a research environment dealing with nutrition, dementia, neurology, elderly patients at the end of life, and development of assessment instruments. The group included both men and women.

All the participants were interviewed individually, and their views were noted and analyzed by the 3 interviewers (I.G.L., C.H., and P.A.). Most of the thoughts were consistent with what the focus groups reported. Only some minor additions were made after comments from the expert group, mainly with regard to social support and social pressure.

Findings

Oral hygiene—a complex activity

The participants' experience and perceptions of factors that affect an older person's ability to perform oral hygiene were extensive, and different perspectives appeared in the various focus groups. These factors fell into 3 main categories: “psychological dimension,” “environmental dimension,” and “functional dimension” (Figure 1). Upon analysis of the data, the latent content of the text was formulated in the core category “oral hygiene—a complex activity.”

The participants pointed out different factors of significance for performing oral hygiene that showed that tooth-brushing is a complex activity. This complexity was especially underlined by the occupational therapists.

Figure 2. Examples of condensed meaning units, codes, subcategories, and categories from the content analysis of the narrative about factors that affect an older person's ability to perform oral hygiene.

Condensed meaning unit	Codes	Subcategory	Category
Fear of blood, pain, gagging	• Fear	Emotion	Psychological
Sensitivity to pain	• Pain		
Depression, loneliness, grief	• Sadness		
Smell, the sight of food scraps	• Disgust		
Knowledge of oral hygiene	• Knowledge	Attitude/motivation	
Learned about oral hygiene in childhood, never/always cared for oral health	• Experience		
Lost spark of life, lack of time, ability to cope	• Motivation		
Forget to brush, cannot learn to use new appliances	• Impaired memory	Cognitive ability	
Mental fatigue, lost power of initiative, concentration	• Initiative		
Finding the way in the mouth, putting appliances in the right place in the mouth	• Spatial competence		
Having to sit during brushing, adapting to new tools, difficulty purchasing utilities, expensive utilities	• Changed routines • Economy	Practical conditions	Environmental
Dependency on others, failure of social support, social pressure to keep up oral hygiene	• Support • Communication	Social context	
Stroke, dementia, arthrosis. Medication. Problems with dry mouth. Problems with sensitivity, cannot feel food left in vestibulum	• Related to disease • Oral clearance • Dry mouth	Oral cavity	Functional dimension
Bodily pain, bodily tiredness movement difficulties, difficulties to lift and hold the arm up	• Muscle strength • Paralysis • Tremor • Balance/coordination	Musculoskeletal system	
Trouble with interdental cleaning	• Eyesight • Impaired motor skills in fingers, rigidity, numbness	Senses	

Tooth-brushing is an activity where difficulties become apparent, as quite a few operations have to be carried out simultaneously for it to become a full activity. [Occupational therapist]

Psychological dimension

In Figures 1 and 2, the 3 subcategories in the psychological dimension are shown: emotion, attitude/motivation, and cognition.

Emotion. Fear of gagging during tooth-brushing and fear of pain and bleeding of the mouth when brushing were emotions emphasized by the participants

as inhibiting oral hygiene efforts. The elderly persons talked about fear of pain or pain itself in relation to cleaning the teeth. They mentioned shooting pain when the steel from the interdental brush is rubbed toward the root surfaces and fear of interdental devices getting stuck between the teeth or even breaking the teeth. The elderly group also expressed disgust at seeing debris on the interdental brush when used and in relation to bleeding when cleaning the teeth. This emotion could make them stop the activity. The assistant nurses mentioned that bleeding during brushing often disgusts the elderly they care for in nursing wards.

And it's really unpleasant when there is bleeding. [Assistant nurse]

When you pull it out, it's full of food scraps and that is really nasty. [Elderly person]

All the interviewed occupational focus groups had thoughts about sadness/grief being an emotion that may affect the way in which people manage everyday life (e.g., the ability to care for their teeth). They had experienced that when elderly persons lost their spouse and/or other relatives and friends, nothing else mattered.

Attitude and motivation. Regarding the subcategory "attitude and motivation," the participants stated that knowledge and experience about why and how oral hygiene should be performed are necessary to achieve good oral health. They also stated that tooth-brushing and other oral hygiene procedures should be learned early in life; otherwise, it will not be given high priority later in life.

You think it's clean . . . and that you do what you've always done, but maybe you don't. [Dental hygienist]

It was also pointed out that motivation is a key factor for performing daily and thorough oral hygiene procedures. Another aspect of motivation that was discussed by the participants was negative life events, such as disease or

the death of a wife or husband, resulting in the loss of a previously good reason to maintain good oral hygiene.

There are many [elderly people] who are ill . . . and lose the motivation to take care of their teeth. [Dental hygienist]

And they have lost a close relative and lost . . . their spark of life. [Dental hygienist]

Cognitive ability. In relation to the subcategory "cognitive ability," impaired memory was stressed in all the focus groups, both explicitly and implicitly, as a factor that affects oral hygiene among the elderly. Forgetfulness was mentioned by the participants as a frequent occurrence that is a part of the everyday life of older patients/persons. The participants stated that impaired memory could lead to older persons forgetting to brush their teeth and not remembering how to brush, how to use new oral care devices, or how to care for new prosthetic constructions.

The occupational therapists discussed the fact that although older people have the required knowledge and understanding about brushing their teeth, their capacity for initiative may be reduced. They may have full muscular mobility, but the activity is still not performed.

They just sit there and know, mentally, that they should brush their teeth, but from thought to action, nothing happens. [Occupational therapist]

The dental hygienists discussed reduced initiative in relation to available time. Even if the elderly persons had lots of time at their disposal, they seemed to lack enough time for oral hygiene.

There doesn't seem to be enough time for all the everyday chores. They brushed their teeth yesterday and got tired and went to bed. And then there was the washing to be done one day this week, and so . . . there simply isn't enough time. [Dental hygienist]

The 3 occupational groups pointed out concentration problems as another factor

that may affect the ability to manage oral hygiene. They had a feeling that some elderly persons were tired and lacked concentration that they postponed oral hygiene procedures or interrupted the activity sooner than they should. All the occupational groups recognized "the great weariness" that may affect many elderly persons.

Another aspect of cognitive ability that was raised was spatial skills, which may be affected, for example, after a stroke. They may find it difficult to manage the toothbrush and interdental devices and to find their way around the mouth.

Finding their way around the mouth may be difficult; they may have impaired sensation and don't know where they place the toothbrush. [Occupational therapist]

Figure 2 gives examples of condensed meaning units for the different codes and subcategories in the psychological, environmental, and functional dimensions.

Environmental dimension

In the environmental dimension, the subcategories "practical conditions" and "social context" were identified (Figs. 1 and 2).

Practical conditions. Changes in routines in the older person's everyday life, for instance, required by disability or illness, were said to be common and may result in new oral hygiene routines with new aids for cleaning the teeth, proposed by the dental profession or decided by the old person himself or herself.

I only use an electric toothbrush. I wouldn't be able to brush my teeth if I didn't have an electric one, as I have problems with tremors and then only an electric one works and it works really, really well. [Elderly person]

The assistant nurses stated, however, that it might be difficult and tiresome to adapt and get used to new aids for personal hygiene. They were skeptical of interdental brushes and thought them very hard for the patients to use.

They also mentioned that relatives do not always buy good equipment that is adapted to the elderly mouth. Another change in routines that was mentioned by the occupational therapists involved the need to adapt to sitting down to brush the teeth due to bodily weakness. They stated that if the mirror and washbasin are not adjusted, it could be difficult for the elderly person to brush the teeth or use interdental brushes.

Many relatives buy the kind of tooth-brush they use themselves and they are way too hard. [Assistant nurse]

There may also be an economic aspect. The cost of the utilities needed was mentioned as a factor preventing relatives or the elderly person from purchasing what is required.

Social context. Regarding the environmental dimension, "social context" was discussed. The expert group emphasized that social support and pressure are important factors that could affect oral hygiene. They pointed out that the social context of the elderly person might result in social pressure to keep up his or her oral hygiene. Social pressure may come from relatives or friends or the elderly person himself or herself wanting to maintain good oral health, even if the ability is reduced. Regarding social support, the expert group stated that elderly persons are often dependent on relatives or others buying oral hygiene utilities. If this assistance fails, the ability to manage oral hygiene may be reduced.

The elderly person may be dependent on a relative or staff for buying oral care products. [Expert]

Functional dimension

The functional dimension contains the subcategories "oral cavity," "musculoskeletal system," and "senses" (Figs. 1 and 2).

Oral cavity. Problems with dryness of the mouth were a main concern in all the focus groups, and it was evident

that a dry mouth causes a great deal of trouble for the elderly person and the caregiver. The dental hygienists pointed out that a dry mouth could result in more plaque retention and the teeth being harder to clean. They also noted that the mucosa often becomes very sensitive, which affects the ability to clean the teeth.

Even if he tries, he doesn't achieve oral clearance; that is, he can't get the mouth really clean. [Dental hygienist]

Another aspect that was discussed in relation to the "oral cavity" was having problems with food retention in the vestibulum, due to dryness of the mouth and reduced sensitivity and weak muscles in the tongue and cheeks. This problem, affecting the ability to clean the teeth, was only discussed by the dental hygienists, and they reported this to be a common finding in their patients. The dental hygienists also had thoughts about reduced sensitivity in the mouth as a possible reason for poor results in terms of cleaning the mouth.

I don't think it's just the motor skills, but also the sensory feeling in the mouth . . . the tongue and the cheek, in particular. [Dental hygienist]

Poor dental status, with decayed and fractured teeth, complicated prosthetic constructions, and missing teeth, was also discussed as a problem in the dental hygienist and expert groups with regard to being able to clean the teeth properly.

Musculoskeletal system. Although not the main focus of the study, all groups had thoughts about limitation of manual dexterity and motor skills in the arms and legs. They emphasized that these limitations may lead to fatigue and lack of motivation or even make it impossible for the elderly person to complete the oral hygiene procedures. The dental hygienists stated that it might be very tiresome to stand still at the washbasin and brush. It was also pointed out that Parkinson disease makes the elderly person stiff and sometimes includes tremors that are troublesome when

brushing. Another aspect related to the musculoskeletal system was balance problems that force the elderly person to sit at the washbasin during oral care.

The person may not have a good enough sense of balance and cannot control the upper body, cannot lift the arm because then he/she falls over. Leaning forward to spit may also be difficult. [Occupational therapist]

Senses. The participants underlined the importance of eyesight when cleaning the teeth. One group talked about adapting the bathroom to make it possible for the older person to sit down while performing daily oral hygiene and to be able to see himself or herself in the mirror. Poor hearing was discussed in relation to the tendency toward withdrawal and living in a "bubble" when hearing is impaired. Overall, this can lead to difficulties grasping instructions about oral hygiene.

But it can affect coping if you can't hear, things get tiresome, as you say, and everything becomes harder and requires more concentration. [Occupational therapist]

Furthermore, in relation to "senses," there was a discussion about several diseases producing a different sensation in the fingers that makes cleaning of the teeth more difficult. Old age, in itself, may produce a different sensation and stiffness of the fingers that hampers dexterity, which may affect interdental cleaning, in particular.

Discussion

The present study has identified a number of factors other than motor skills in the arms, hands, and fingers that affect the ability of elderly persons to perform oral self-care. To our knowledge, this is the first study trying to explore these factors.

Motor skills are a factor that is well known to affect the ability to maintain oral hygiene, and this function decreases with age and disease (Hackel et al. 1992; Dayanidhi and Valero-Cuevas 2014).

Several instruments have been developed to measure motor skills with regard to oral hygiene (Doherty et al. 1994; Felder et al. 1994; Bauer 2001). Prior to the interviews with the focus groups, it was made clear to the participants that factors other than motor skills were sought for. Despite this, the motor skills seemed central and were discussed in several of the groups.

By using focus groups, a variation in experience, insight, and understanding on the research question was achieved. The participants represented different professional categories, with the common feature for the 3 occupational groups that they all work with older people in the health service. They applied different perspectives to the performance of oral hygiene. Furthermore, they also had a variety of experience and were of different age, which allowed for different ways of considering the research question. The dental hygienists applied an oral health perspective and discussed the patients they met and their problems extensively during the interview. The assistant nurses focused mainly on oral hygiene utilities and practical problems that they experience in nursing care. Cognitive ability and problems related to the musculoskeletal system were the major focus in the group of occupational therapists. The discussions within the group of elderly persons mainly dealt with their own situation, and they had difficulty applying a broader perspective and relate to problems that may affect other elderly persons (Tornstam 1997). The focus group interviews, together with individual interviews with the expert group, ensured a broad selection of data. By using content analysis to analyze the data, both manifest and latent content could be illuminated (Graneheim and Lundman 2004).

The author who carried out the interviews and the observer were both dentists. This may have affected the discussion among the participants, but it is unlikely that the results would have been different had they not been dentists. The interviews were held in a neutral place, and all the participants

could speak freely and choose the topics they considered important, within the scope of the interview question. Furthermore, both the author and the observer had many years of experience working with elderly patients. This experience and their knowledge of the phenomenon in focus were a strength during the interviews.

Regarding credibility, the research question was in focus during the interviews and the analysis process. The data were analyzed in close collaboration between 3 of the authors to optimize plausibility. The participants were thoroughly informed about the purpose of the study, and their statements were considered trustworthy and reasonable. Furthermore, an expert group was involved to ensure that no aspect of the findings was missed. After 4 focus group interviews, no further information of importance was added. This decision was endorsed by the group of experts; however, the experts added valuable thoughts about social pressure and social support. The findings in our study can provide dental staff with a deeper understanding of the phenomenon in focus but cannot be transferred to apply to all elderly people in all cultures.

According to Paul Ekman (Ekman and Cordaro 2011), the 7 basic emotions are anger, disgust, fear, happiness, sadness, surprise, and contempt. Three of these emotions—fear, disgust, and sadness/grief—were identified in the present study and appeared as strong influencing factors affecting the ability to maintain oral hygiene. Pain was another factor that was discussed in the study. Pain is described by the International Association for the Study of Pain (IASP 1994) as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” Thus, pain is not a basic emotion but closely linked to fear and can lead to the avoidance of certain activities. The interviews revealed that the group of elderly individuals experienced fear when using interdental brushes. They mentioned pain and fear of pain from the twisted steel shaft, fear of bleeding or of

hurting the gums and of the brush getting stuck between the teeth, or fear of even of breaking the teeth. The elderly group also expressed disgust at seeing debris and food scraps on the brush and said that this might prevent them from using this tool. The feeling of disgust is often related to food or smells and varies with the culture (Ekman and Cordaro 2011). The 2 emotions of fear and disgust were unexpected findings, as they are rarely described in conjunction with interdental cleaning but are found related to gagging when brushing (van Houtem et al. 2015). The frustration expressed by the group of elderly in conjunction with interdental brushes was surprising, as these brushes are the most commonly recommended tool for interdental cleaning in Sweden. The question arises to what extent the brushes are used. This calls for further studies.

Sadness is a basic emotion, and grief is described as deeper sadness (Ekman and Cordaro 2011). All groups talked extensively about what happens when you lose a spouse or a close friend. The sadness or grief makes life grayer, and it is hard to keep up normal activities, which may include daily oral hygiene. Loss of initiative and weariness are closely related to sadness or grief. Lack of concentration and fatigue are often seen among stroke patients and patients with early onset of dementia or other cognitive changes (World Health Organization 2001; Kirkevold et al. 2012).

Motivation was found to be closely linked to emotions. Fear or grief has been shown to influence motivation strongly (Young 1961). If the burden of disease or the loss of a related person gets too heavy, the motivation for good oral health may decrease and be hard to regain. Knowledge and experience were discussed as motivational factors for maintaining oral hygiene, and it was emphasized that this habit must be founded early in life. This may affect the attitude toward oral hygiene throughout a person's life. The importance of continuous preventive measures and information about new technologies

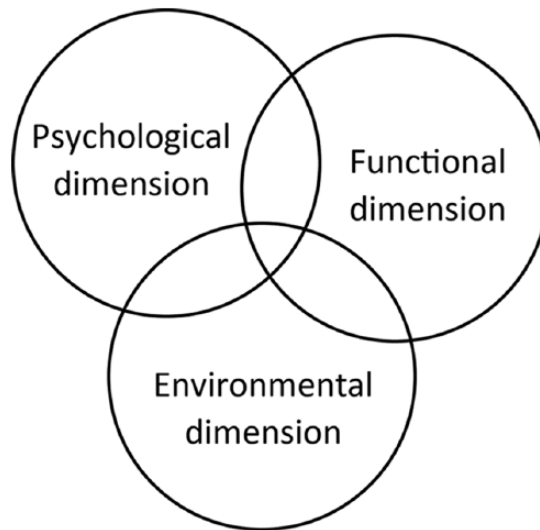
related to oral health was underlined. The importance of dental staff educating patients about oral hygiene was also highlighted.

Practical conditions can be interpreted as a change in routines. This may be due to disease, disability, economic difficulties, or changes to the life situation that prevent the older persons from maintaining their habits. It could also involve difficulties to adapt to new tools or having to sit down at the washbasin in the bathroom. There was also concern about new conditions in the mouth that may be difficult to adjust to and/or learn to manage. New constructions or new utilities may be difficult to adapt to at an older age. As for motor skills, they mostly involved balance, coordination, and stiffness of the fingers and joints due to different diseases. This is closely connected to practical conditions, as it leads to new strategies to cope with everyday tasks, such as oral self-care.

The importance of social context was emphasized by the expert group. Social context refers to the way of life of the elderly person: city life, rural areas, family, friends, and social contacts. Being included in a social context may lead to the desire to care for one's oral health being maintained (Avlund et al. 2013). On the other hand, it has been shown that the loss of a spouse or living alone may affect the attitude to oral self-care (Burr and Lee 2013; Strömberg et al. 2013). Social context and the attitudes to oral health of caregivers/relatives are of great importance. Thus, the social support from relatives or the social services is of great value to the frail, elderly person; however, it may also be a burden for the elderly person to be dependent on others, as well as to be a caregiving relative of a dependent person (Chappell and Reid 2002; Clegg et al. 2013).

Food and plaque getting stuck between the teeth or in the vestibulum owing to mouth dryness and/or impaired tongue motor skills were perceived to have a major impact on the ability to clean the mouth. Both reduced sensitivity to scraps of food getting stuck in the mouth and

Figure 3. Illustration of how the constituent categories overlap and influence each other.



increased sensitivity, due to thin and fragile mucous membranes, were raised factors that hinder proper oral care.

Our results show that no specific factor affects the capacity for oral hygiene more than any other and that the 3 categories may overlap (Fig. 3). The elderly person may have a single problem that is related to one of the dimensions or several factors that may relate to all 3 dimensions. Both scenarios demonstrate the complexity of the problem, and in both cases, the maintenance of oral hygiene may fail. A comprehensive instrument is needed to be able to identify elderly individuals with difficulty managing oral hygiene, as well as the cause of the difficulties. Thus, a future aim in this project will be to develop such an instrument.

In conclusion, this study shows that oral hygiene is a complex activity and that many aspects have to be considered when assessing an elderly person's ability for oral self-care. All these aspects must be taken into account when an instrument to assess the ability for oral hygiene self-care is developed.

Author Contributions

I. Grönbeck Lindén, C. Hägglin, contributed to conception, design, data acquisition, analysis, and interpretation, drafted and critically revised the manuscript; L. Gahnberg, contributed

to conception, design, and data interpretation, drafted and critically revised the manuscript; P. Andersson, contributed to design, data analysis, and interpretation, drafted and critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

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