

Comparison of Oral Health Status on Admission and at Discharge in a Group of Geriatric Rehabilitation Patients

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Purpose: The aim of this study was to compare oral health status on a geriatric rehabilitation ward among patients who were assessed using the Revised Oral Assessment Guide (ROAG) on admission and at discharge; and to investigate in what respect the oral health procedures (OHP) suggested in ROAG were applied when oral health problems were detected.

Materials and Methods: Registered nurses on the ward performed oral health assessments using ROAG with 107 patients on admission and at discharge. When oral health problems were detected measures to be taken were suggested using ROAG.

Results: Oral health problems were common among the patients on admission (86%), as well as at discharge (51%). The frequency of the problems was significantly lower at discharge compared to admission. The OHP that were recommended in ROAG were completely followed when saliva flow-related problems were detected. Regarding other oral health problems, measures other than the recommended ones were often performed.

Conclusion: This study demonstrated that the oral health was better at the end of the hospital stay compared to admission.

Key words: geriatric rehabilitation patients, nursing care, oral assessment guide, oral health procedures, oral health status

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The oral health status among elderly patients at hospital is often reported to be poor. Caries has been demonstrated in the range of 61–72% (Vigild, 1989; Budtz Jørgensen et al, 1996a,b), with periodontal diseases approaching 100% (Mojon et al, 1995; Meurman et al, 1997; Pajukoski et al, 1999), mucosal lesions in the range of 51–72% (Brauer et al, 1986; Budtz Jørgensen et al, 1996b; Mersel,

2000), and dry mouth in 55% of the patients (Pajukoski et al, 1997). Furthermore, poor oral or prosthesis hygiene was demonstrated in the range of 58–95% (Stuck et al, 1989; Sullivan et al, 1993; Mojon et al, 1995; McNally et al, 1999; Mersel, 2000).

Poor oral health status may cause difficulties with eating, thereby possibly affecting the nutritional status (Andersson et al, 2002a), as well as the general health status and the well-being of the patient (Gift and Redford, 1992; Walls et al, 2000). Accordingly, nursing personnel should be educated and motivated in monitoring patients' oral health status during their hospital stay.

An oral assessment guide may be a valuable tool for nurses to detect oral health problems and to initiate adequate oral health procedures (Eilers et al, 1988; Kayser-Jones et al, 1995). The Oral Assessment Guide developed by Eilers et al (1988) has

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Table 1 Reasons for exclusion of 83 patients

Reasons for exclusion	n
Died during the hospital stay	7
Refused oral assessments	7
Oral assessments not performed on admission	7
Oral assessments not performed at discharge	62

been revised for use in elderly patients. The inter-rater reliability was reported to be good between a dental hygienist and a registered nurse (RN) using ROAG in a group of geriatric rehabilitation patients (Andersson et al, 2002b). ROAG was also found to be a useful tool in detecting oral health problems among elderly (Andersson et al, 2002a).

It has been reported that nurses have gaps in their knowledge and skills in how to prevent oral health problems (Adams, 1996; Matear, 1999). Therefore, suggestions are included in ROAG for oral health procedures to be performed when problems are detected in the oral cavity. It is possible that such procedures may prevent deterioration and even improve the oral health status during a hospital stay.

The aim of this study was to compare oral health status on a geriatric rehabilitation ward among patients who were assessed using ROAG on admission and at discharge. A further aim was to investigate in what respect the oral health procedures suggested in ROAG were applied when oral health problems were detected.

MATERIALS AND METHODS

The study took place at a geriatric rehabilitation ward at a hospital in the south of Sweden. A cohort of 237 patients consecutively admitted during November 1996 to November 1997 was included. Eighty-three patients were excluded due to incomplete data (Table 1). Oral health status was assessed in 154 patients by RNs on admission and at discharge from the hospital. Patients had to be at the hospital for ≥ 14 days to be included in the

study. Among the 154 patients with complete data on admission and at discharge 47 patients were excluded due to a shorter period of hospitalization. Analyses were performed on the remaining sample of 107 patients, 51 (48%) men and 56 (52%) women. The mean age was 77.8 years (SD ± 6.9). Admission to the ward was mainly for rehabilitation following a stroke (69%). The patients stayed on the ward for 30.7 days (median; q_1 - q_3 18-38 days; range 14-108 days). Based on the Katz ADL-index f-g (Katz and Akpom, 1976), 58% of the patients were in great need of help in their daily lives.

Dropout analysis of the patients for whom oral assessments were performed only on admission, including those that died during the hospital stay ($n=69$), and the study sample ($n=107$), demonstrated no significant differences regarding age, gender, reason for admission to the ward or dependence in help with daily activities. However, the dropouts had a shorter hospital stay than the study sample ($p<.0005$).

Before the start of the study a dental hygienist gave a lecture on oral health problems and trained one RN on the ward to perform the oral assessments using ROAG (Table 2). The inter-rater reliability of the ROAG measured by Cohen's Kappa coefficient ranged from moderate to very good agreement between the dental hygienist and the RN for 66 geriatric rehabilitation patients (for details, see Andersson et al, 2002b). During the first six months of the study the RN performed all oral assessments on the ward ($n=60$). After six months the dental hygienist gave a lecture on oral health problems and how to use ROAG to nine other RNs on the ward. Calibrations in the performance of the oral assessments were made between the originally trained RN and the other RNs at the ward. After this training session all nurses performed the assessments. During the entire length of the study the nurses on the ward had the opportunity to consult a dental hygienist if needed.

Revised Oral Assessment Guide

Eight categories are included in ROAG: voice, lips, mucous membranes, tongue, gums, teeth/dentures, saliva and swallowing (Table 2). Each category is described and rated from healthy (score 1) to severe oral health problem (score 3). Procedures that should be performed when problems in oral health status were found are included in ROAG.

Table 2 Revised Oral Assessment Guide, ROAG. Modified from Eilers et al (1988) with permission from Nebraska Medical Centre

Category	Method	Numerical and descriptive rating			Procedures
		1	2	3	
Voice	Converse with the patient	Normal	Deep or rasping	Difficulty talking or painful	Consult doctor
Lips	Observe	Smooth and pink	Dry or cracked, and/or angular cheilitis	Ulcerated or bleeding	Consult doctor or dentist
Mucous membranes Dentures removed	Observe Use light and mouth mirror	Pink and moist	Dry and/or change in color, red, blue-red or white	Very red, or thick, white coating Blisters or ulceration with or without bleeding	Consult doctor or dentist
Tongue	Observe Use light and mouth mirror	Pink, moist and papillae present	Dry, no papillae present or change in color, red, or white	Very thick white coating Blisters or ulceration	Consult doctor or dentist
Gums	Observe Use light and mouth mirror	Pink and firm	Edematous and/or red	Bleeding easily under finger pressure	Support with oral care Consult dentist or dental hygienist
Teeth/dentures	Observe Use light and mouth mirror	Clean, no debris	1) Plaque or debris in local areas 2) Decayed teeth or damage dentures	Plaque or debris generalized	1) Support with oral care 2) Consult dentist
Saliva	Slide a mouth mirror along the buccal mucosa	No friction between the mouth mirror and mucosa	Slightly increased friction, no tendency for the mirror to adhere to the mucosa	Significantly increased friction, the mirror adhering or tending to adhere to the mucosa	Support with oral care Artificial saliva substitute
Swallow	Ask the patient to swallow Observe Ask the patient	Normal swallow	Some pain or difficulty on swallowing	Unable to swallow	Consult doctor

Interventions

Standardized oral health assessments were not performed on the ward before initiation of this study. Patients in need of support were offered oral care from the assistant nurses at the ward. After initiation of this study oral health procedures (OHP) were to be performed by the assistant nurses in accordance to the recommendations in ROAG. The oral care included toothbrushing, interdental clean-

ing, cleaning of dentures, cleaning and moisturizing of mucous membranes and tongue, and lubrication of lips. The need for support varied depending on the patients' health status. Artificial saliva substitute was given to patients with dry mouth. A physician was consulted in case of uncertain treatment needs. A dentist or dental hygienist at the dental clinic in the hospital was consulted when needed. In addition to the OHP, measures were taken in order to improve eating. These measures included

Table 3 Oral health problems on admission and at discharge in patients at a geriatric rehabilitation ward (n=107)

Oral assessment category	Oral health problems on admission n (%)	Oral health problems at discharge n (%)	p-value
Voice ¹	15 (16)	4 (4)	<0.002
Lips	35 (33)	8 (7)	<0.0005
Mucous membranes	23 (21)	10 (9)	<0.003
Tongue ²	41 (39)	11 (10)	<0.0005
Gums	26 (24)	10 (9)	<0.0005
Teeth/dentures	54 (50)	29 (27)	<0.0005
Saliva	12 (11)	4 (4)	<0.022
Swallow ²	28 (26)	12 (11)	<0.0005

McNemar Test
¹ no data for 12 patients due to aphasia
² no data for 1 patient

compensatory strategies to improve swallowing, optimizing sitting position when eating, eliminating disturbing noises, putting only small pieces of food into the mouth, adjusting consistencies of food, and using energy-enriched food and dietary supplements.

Nurses informed the patients about the study when they were admitted to the ward. It was stressed that participation was voluntary. The Ethics Committee of the Medical Faculty, Lund University (LU-90-97), approved the study.

Statistics

The McNemar Test was used to compare the patients' oral health status on admission with the oral health status at discharge. The ratings in ROAG were dichotomized; 0= oral score 1, and 1= oral score 2 and 3. *p*-values less than .05 were considered statistically significant. Analyses were performed using SPSS 10.0.

RESULTS

On admission 86% of the patients were detected to have at least one and at most eight oral health problems. At discharge 51% of the patients had at least one and at most five oral health problems. Oral health status was assessed as worse at dis-

charge in 4% of the patients. In 24% of the patients oral health status was unchanged at discharge compared to admission (no oral health problem at all, or problems with oral health).

Problems related to teeth/dentures were most frequent both on admission and at discharge, 50% and 27% respectively (Table 3). Significantly fewer oral health problems were found in all assessment categories at discharge compared to admission. Tongue-related problems were detected in 39% on admission and in 10% at discharge (*p* .0005).

A worse oral health status was found in patients with problems related to lips (3%), mucous membranes (2%), teeth/dentures (4%) and saliva (1%).

Overall, 74% of the patients received OHP. Support with oral care was given to 42% of the patients and artificial saliva substitute to 28%. In 25% of the patients a physician was consulted, and in 18% a dentist or a dental hygienist was consulted. Among the patients with oral health problems 20% were not given any OHP. The most common problems among these patients were related to teeth/dentures.

All 12 patients with problems related to saliva flow were given artificial saliva substitute, as recommended in ROAG (Table 4). Fifty percent with this problem also received support with oral care. However, patients with oral health problems related to voice, lips, mucous membranes, tongue and swallowing were often given other OHP than the ones recommended in ROAG. In 33% of the 15 pa-

Table 4 The proportion of oral health procedures according to ROAG in patients with oral health problems on admission at a geriatric rehabilitation ward (n=107)

Oral health problems in assessment category	Recommended oral health procedures	(%)	Other oral health procedures than recommended	(%)
Voice (n = 15)	Consult a physician	33	Artificial saliva substitute	86
Lips (n = 34)	Consult a physician Consult a dentist	31 14	Lubrication of lips	80
Mucous membranes (n = 23)	Consult a physician Consult a dentist	30 30	Artificial saliva substitute	43
Tongue (n = 42)	Consult a physician Consult a dentist	57 14	Artificial saliva substitute	48
Gums (n = 26)	Support with oral care Consult a dentist or a dental hygienist	65 23		
Teeth/dentures (n = 54)	Support with oral care Consult a dentist	57 17		
Saliva (n = 12)	Support with oral care Artificial saliva substitute	50 100		
Swallow (n = 30)	Consult a physician	33	Artificial saliva substitute	30

tients with problems related to voice a physician was consulted as recommended in ROAG whereas 86% received artificial saliva substitute although this was not recommended.

In a subsample of 60 patients the oral health assessments were performed by the same RN on admission and at discharge. In a previous paper the inter-rater reliability between a dental hygienist and the RN was found to be good (Andersson et al, 2002b). In these 60 patients 83% had oral health problems on admission. The corresponding figure at discharge was 50%.

Significantly fewer oral health problems were found except for mucous membranes and saliva at discharge compared to admission (Table 5).

In the subsample 75% of the patients were given OHP. Support with oral care was given to 42% of the patients and artificial saliva substitute to 28%. In 27% of the patients a physician was consulted, and in 13% a dentist or a dental hygienist was consulted. Among the patients with oral health problems, 16% were not given any OHP. The proportion of OHP is presented in Table 6.

DISCUSSION

A high proportion of the patients in this study had oral health problems on admission as well as at discharge. The frequency of oral health problems was significantly lower at discharge than on admission. It is possible that the OHP given during the hospital stay resulted in the improved oral health status. However, measures were also taken to improve eating, which may have contributed to the improved oral health status at discharge in patients with deficient nutritional status.

Inter-rater reliability testing between all nurses on the ward and a dental hygienist was not performed. However, good inter-rater agreement has been reported between the RN and a dental hygienist (author PA) (Andersson et al, 2002b). The RN measured all the 60 patients included in the subsample. Comparing the subsample to the total sample only minor differences were found indicating that the nurses on the ward and the RN assessed the oral health status in a similar manner. Improvements were found in all assessment cate-

Table 5 Oral health problems on admission and at discharge in patients at a geriatric rehabilitation ward (n=60)

Oral assessment category	Oral health problems on admission n (%)	Oral health problems at discharge n (%)	p-value
Voice ¹	7 (13)	1 (2)	<0.032
Lips	20 (33)	4 (7)	<0.0005
Mucous membranes	9 (15)	6 (10)	<0.454
Tongue	26 (43)	9 (15)	<0.0005
Gums	16 (27)	7 (12)	<0.005
Teeth/dentures	28 (47)	15 (25)	<0.005
Saliva	6 (10)	2 (3)	<0.220
Swallow ²	11 (19)	5 (8)	<0.032

McNemar Test
¹ no data for 5 patients due to aphasia
² no data for 1 patient

Table 6 The proportion of oral health procedures according to ROAG in patients with oral health problems on admission at a geriatric rehabilitation ward (n=60)

Oral health problems in assessment category	Recommended oral health procedures	(%)	Other oral health procedures than recommended	(%)
Voice (n = 7)	Consult a physician	43	Artificial saliva substitute	86
Lips (n = 20)	Consult a physician Consult a dentist	35 5	Lubrication of lips	80
Mucous membranes (n = 9)	Consult a physician Consult a dentist	33 33	Artificial saliva substitute	55
Tongue (n = 26)	Consult a physician Consult a dentist	61 11	Artificial saliva substitute	42
Gums (n = 16)	Support with oral care Consult a dentist or a dental hygienist	50 19		
Teeth/dentures (= 28)	Support with oral care Consult a dentist	57 11		
Saliva (n = 6)	Support with oral care Artificial saliva substitute	33 100		
Swallow (n = 12)	Consult a physician	33	Artificial saliva substitute	25

gories at discharge compared to admission, except for saliva and mucous membranes in the subsample. In the subsample a physician was more often consulted regarding problems related to voice, while fewer patients received recommended oral health procedures when problems related to gums were detected.

It was easy to introduce oral assessments in the routines of nursing care on admission. However, in 32% of the patients the oral health assessments were not performed at discharge. Lack of time or motivation among the nurses may be reasons for the failure to obtain a new oral assessment of the patients.

A high frequency of oral health problems on admission indicates a poor oral health status when patients were admitted to the geriatric rehabilitation ward. This is in agreement with a paper by Pajukoski et al (1999). One explanation for this is that the ability to manage self-care may decrease with age, resulting in oral health problems. Furthermore, the use of dental services has been reported to decrease with increasing age (Kiyak, 1986). Mersel et al (2000) reported that 53% of geriatric patients had not visited the dentist for at least five years. In contrast, McNally et al (1999) found that 76% of elderly patients in hospital had visited the dentist within the last two years. Data regarding dental visits before the hospital stay among the patients in this study were not available.

On a patient-based level 86% of the admitted patients in this study were found to have oral health problems. This is in the same range as reported by others (Brauer et al, 1986; Stuck et al, 1989; Vigild, 1989; Sullivan et al, 1993; Mojon et al, 1995; Budz-Jørgensen et al, 1996a, b; Meurman et al, 1997; Pajukoski et al, 1997; McNally et al, 1999; Pajukoski et al, 1999). However, these studies reported on specific oral health problems such as caries, periodontal diseases and dry mouth, and the diagnosis were performed by experienced dental personnel. The primary goal for the use of an oral assessment guide in nursing care is not to make specific diagnosis but rather to detect individuals with oral health problems. In spite of the fact that ROAG is a relatively blunt assessment tool and that the nurses had limited training in oral assessments, a high frequency of patients with oral health problems was detected. The patients were considered to have oral health problems if one or more assessment categories had an oral score of 2 or 3. It is therefore not surprising to find a high percentage of individuals categorized as having oral health problems. In a study by Isaksson et al (2000) oral mucosal dryness was reported in 70% of elderly in long-term care facilities using the mirror test. This is much higher than we found in this study also using the mirror test. A possible explanation for the differences in the results is differences in population group. The elderly in the study by Isaksson et al (2000) may have used more medications than the patient group in our study, and therefore had more problems with dry mouth.

Problems related to teeth and dentures were common among the patients regardless if OHP had been given or not. This indicates that the patients

were in need of OHP other than the suggested ones, or that the oral care support given was unsatisfactory. The nursing personnel or the elderly may have inhibited the oral care. Eadie and Shou (1992) reported that nursing personnel disliked taking care of patients' teeth or dentures, and it is also common that elderly refuse support for oral care (Wårdh et al, 1997).

The RNs on the ward had not systematically performed oral health assessments before the initiation of this study. Despite the short training session the implementation of ROAG was satisfactory and the nurses' capability in detecting oral health problems was found to be good. However, the recommendations in ROAG regarding OHP to be performed were not followed. Other procedures than the recommended ones were often performed or combined with the recommended procedures, and in 21% of the patients no OHP at all were given. It is possible that the procedures advised in ROAG need to be revised and/or that nursing personnel need to be better motivated in taking actions.

It is not possible to evaluate the effect of the OHP provided in this study. However, it is interesting to note that changes in oral health status on a patient based level can be followed and observed using ROAG. This study demonstrated that oral health improved during the patients' stay in hospital. The use of an oral assessment guide may highlight the mouth as an integrated part of the body that needs attention in nursing care of the elderly.

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