

# Oral Health Status of Older Adults in Sweden Receiving Elder Care

## *Findings From Nursing Assessments*

Isabelle Johansson ▼ Henrik Jansson ▼ Ulrika Lindmark

**Background:** Frail elderly people often have poor oral hygiene, contributing to oral health problems that can detract significantly from quality of life.

**Objective:** The aim of this study was to describe oral health status of frail elderly individuals using the Revised Oral Assessment Guide-Jönköping (ROAG-J), a mouth assessment instrument that can be used in daily nursing care.

**Methods:** Data were obtained from the Swedish Senior Alert quality registry in one Swedish municipality. ROAG-J assessments on admission to elder care and one subsequent occasion were used. ROAG-J measurements documented oral health in nine areas: voice, lips, oral mucosa, tongue, gums, teeth, saliva, swallowing, and presence of any prostheses or implants. Assessments were made by nursing staff during the course of daily nursing care.

**Results:** Individuals 65 years of age or older and receiving elder care services ( $N = 667$ ) were involved; 1,904 assessments made between November 2011 and March 2014 were used for the analysis. On the basis of both assessments, less than one third of participants had oral health problems. No significant difference in any of the oral health variables was found between first and subsequent assessments. At first assessment, men and women differed in tongue health ( $p < .01$ ); at the subsequent assessment, gender differences in voice ( $p < .05$ ), mucous membranes ( $p < .003$ ), tongue ( $p < .01$ ), and saliva ( $p < .006$ ) were observed.

**Discussion:** Most participants had good oral health. Assessments made by nursing staff using the ROAG-J demonstrate that this tool can be used in daily nursing care, where different, important oral conditions may be encountered. However, knowledge about oral health conditions and the ROAG-J instrument is important to ensure high validity. The ROAG-J enables nursing staff to detect problems in the mouth and to guide decisions related to oral health interventions.

**Key Words:** dental care for aged • frail elderly • geriatric nursing • oral health • quality improvement • Sweden

*Nursing Research*, May/June 2016, Vol 65, No 3, 215–223

A growing number of the increasing population of elderly people in Sweden (Statistics Sweden, 2010) have more teeth, often due to advanced prosthetic dental constructions (Ahlqwist, Bengtsson, Hakeberg, & Hägglin, 1999; Norderyd et al., 2015). The oral health of elderly people is often poor, and it is poorer among frail and ill elderly people than among fit and active elderly people (Petersen & Yamamoto, 2005). Oral health has a major impact on the quality of life of elderly people in many ways, including appearance, communication, and freedom from

pain and discomfort (Kiyak, 2000; Nitschke & Müller, 2004; World Health Organization, 2006).

In Sweden in 2011, approximately 14% of all individuals  $\geq 65$  years received home care service (9%) or lived permanently in retirement homes (5%). Of those older than 80 years, 23% received home care service and 14% lived in retirement homes (National Board of Health and Welfare, 2012). Within care systems for the elderly people, it is a part of the nursing staff's task to help residents with oral hygiene.

Oral diseases and symptoms—such as dental caries, periodontitis, and dry mouth—are more frequently observed in older age groups, depending on different oral health-related risk factors such as general diseases, dysfunctions, and medications (Murray Thomson, 2014; World Health Organization, 2006). Maintaining oral health is usually more difficult in the context of the mental and physical changes caused by aging, and for this reason, a greater effort to support the oral health of frail and ill elderly people is needed (Petersen, Kandelman, Arpin, & Ogawa, 2010; Strömberg,

**Isabelle Johansson, RDH, MS**, is Research Assistant, Department of Natural Sciences and Biomedicine, Centre for Oral Health, School of Health and Welfare, Jönköping University, Sweden.

**Henrik Jansson, DDS, Odont Dr**, is Associate Professor, Department of Natural Sciences and Biomedicine, Centre for Oral Health, School of Health Sciences, Jönköping University; and Department of Periodontology, Centre of Oral Health Sciences, Malmö University, Sweden.

**Ulrika Lindmark, RDH, MSc, PhD**, is Senior Lecturer, Department of Natural Sciences and Biomedicine, Centre for Oral Health, School of Health and Welfare, Jönköping University, Sweden.

DOI: 10.1097/NNR.0000000000000158

Hagman-Gustafsson, Holmén, Wårdh, & Gabre, 2012). About 70% of the residents receiving home care did not have adequate oral hygiene (Andersson, Hallberg, Lorefält, Unosson, & Renvert, 2004). In a Norwegian study, more than 40% of the patients in nursing homes had unacceptable oral hygiene (Willumsen, Karlson, Næss, & Bjørntvedt, 2012), which may be due to a lack of knowledge, time, or attitudes among both patients and nurses. Moreover, a common opinion among nursing staff is that oral hygiene is a difficult task (Wårdh, Andersson, & Sörensen, 1997) and plays a subsidiary role compared with other nursing tasks. For this reason, structured oral care activities in daily nursing care are recommended (Lindqvist, Seleskog, Wårdh, & von Bültzingslöwen, 2013).

Systematic examinations to detect oral health deviations and illness have rarely been carried out by the nursing staff in retirement homes. In the United States, the Minimum Data Set Section L (Oral Health Assessment) is used by nurses working with elderly people receiving long-term care (Pacific Center for Special Care, 2015). In Sweden, a standardized measurement instrument for nursing staff has been developed with the aim of serving as a tool for examining and detecting problems and illness of the mouth, as well as determining the need for improved oral hygiene or dental care (Andersson, 2004). The standardized measurement instrument used for measuring oral health, the Revised Oral Assessment Guide-Jönköping (ROAG-J), used in this study is an adapted version of the ROAG (Andersson, Hallberg, & Renvert, 2002), which, in turn, is a development of the Oral Assessment Guide (Eilers, Berger, & Petersen, 1988). The ROAG-J is designed to support health-care providers through recommendations regarding different oral health problems based on items in the ROAG-J (Andersson et al., 2002; Senior Alert, 2014). (This tool is intended for screening evaluation and documentation and should not be used for diagnostic purposes.)

Senior Alert is a Web-based quality registry developed to improve and develop the care for elderly people in Sweden. Data in the registry include information about five health issues common to elderly people: prevention of falls, pressure sores, malnourishment, bladder dysfunction, and oral health (Senior Alert, 2014).

---

### *Senior Alert is a Web-based quality registry developed to improve and develop the care for elderly people in Sweden.*

---

The ROAG has been shown to be an effective tool to identify problems of oral health during hospitalization (Andersson, Hallberg, & Renvert, 2003) and to enable nursing staff to identify problems with oral health among elderly patients (Paulsson, Wårdh, Andersson, & Öhrn, 2008). The scientific body of evidence relating to the systematic use of

the ROAG-J in daily nursing care is limited. Moreover, to our knowledge, there are no longitudinal studies investigating the systematic use of the ROAG-J in everyday practice. The ROAG-J is now commonly used within daily nursing care in Sweden (Senior Alert, 2014). Yet, it is important to investigate and evaluate the use of the instrument in assessing the oral health of elderly people over a longer period of time. Therefore, the aim of this study was to describe oral health status using a mouth assessment instrument, in the daily nursing care of frail elderly individuals on admission and a subsequent occasion.

## METHODS

### Population and Sample

A descriptive and longitudinal study with an empirical design was performed, using the mouth measurement instrument ROAG-J. The sample consisted of subjects from the Swedish Senior Alert register data based on all frail and ill elderly people receiving care services, representing one municipality (approximately 100,000 inhabitants) in Sweden. Data from private retirement homes as well as homes owned by the municipality were included. The participants lived in four different settings: short-term accommodation; own homes with care by home care teams; retirement homes (which also included special housing for people with dementia); and accommodation provided according to the Swedish Act concerning Support and Service for Persons With Certain Functional Impairments (i.e., LSS; Ministry of Health and Social Affairs, 1993). The elderly care service in the municipality has systematically performed ROAG-J assessments since 2011 and had access to a sufficiently large amount of data over time for analysis, making this municipality the most appropriate to be evaluated. The data were based on assessments of individuals 65 years or older who were enrolled in elderly care in the selected municipality and who had taken part in two or more ROAG-J assessments between November 2011 and March 2014. Registry data from 667 elderly people formed the basis of the analysis.

### Instrument

Data were collected using ROAG-J, which was used to evaluate oral health by assessing the condition of the voice, lips, oral mucosa, tongue, gums, teeth, saliva, swallowing, and any prostheses/implants. The examiners (nursing staff at retirement homes) used a graded scale to assess oral health, using these values: 0 = *not relevant to assess*, 1 = *healthy or normal condition*, 2 = *moderate changes/deviations*, and 3 = *severe changes/deviations* (Table 1). Grades 0–1 do not require any action. Grade 2 deviations are to be treated by the nursing staff at the unit, with recommended preventive care action. Each item implies specific oral health actions, such as moistening of the mucous membranes, assistance with performing

**TABLE 1. Revised Oral Assessment Guide-Jönköping: Scoring Guide**

Item	Grade 0	Grade 1	Grade 2	Grade 3
Lips		Smooth; bright red; moist	Dry, cracked, sore corners of the mouth	Ulcerated, bleeding
Voice		Normal voice	Dry, hoarse, smacking	Difficult to speak
Mucous membranes		Bright red; moist	Red; dry or areas of discoloration, coating	Wounds, with or without bleeding, blisters
Tongue		Pink, moist with papillae	No papillae, red, dry coating	Ulcers with or without bleeding, blistering
Gums	No gums, only oral mucosa	Light red and solid	Swollen, reddened	Spontaneous bleeding
Teeth	No natural teeth	Clean; no visible coating, food debris	Coating or food debris locally	Coating, food debris generally or broken teeth
Dentures	No prosthetic	Clean; works	Coating or food debris	Not used or malfunctioning
Saliva		Runs freely	Runs sluggishly	Does not run at all

Note. Grades 0 and 1 do not require any actions. Deviations of Grade 2 are to be treated by the nursing staff at the unit with recommended preventive care action. The recommendation for deviations of Grade 3 is to contact a dentist or physician for treatment (Senior Alert, 2015).

oral hygiene, and dietary recommendations. This is described in the ROAG-J manual (Senior Alert, 2015) used by the nursing staff. The recommendation for Grade 3 deviations is to contact a dentist or a physician for treatment (Andersson, 2004). On the basis of these assessments and related to the included oral health recommendations, this tool is designed to support nursing staff and improve the oral health of elderly people.

Before implementation, the nursing staff received a standardized, 1-day education and training on how to use the ROAG-J instrument from dental personal responsible for Senior Alert. Internet-based training is also available if needed. The assessment takes 3–4 min to perform for an experienced practitioner. Moderate to good interrater reliability (mean  $\kappa$  estimate = 0.59), intrarater reproducibility ( $\kappa$  estimate = 1.00), and high sensitivity and specificity within elderly care in previous studies have been reported (Andersson et al., 2002; Ribeiro, Ferreira, Vargas, & Ferreira 2014).

Grades for each item are used to obtain a total score on the ROAG-J. The potential range of scores is 0–27. Higher scores indicate poor oral health.

### Data Collection

Nursing staff performed all the assessments and entered data into the ROAG-J forms in Senior Alert's computer system at the time of the mouth assessment. The first assessment was carried out in connection with the first contact with health and social services. Subsequent assessments should be made twice per year or in connection with health changes and/or changes in eating habits. Follow-up assessments were performed in cases where oral health deviations were found at the initial assessment or when patients were considered at risk of developing problems or illness. Follow-up assessments were used to evaluate the implemented prevention care (Senior Alert, 2014). During the inclusion period, a total of 1,904 ROAG-J assessments were performed. Of these, the first and the last registered assessment on each participant were

used for this analysis. Therefore, in this study, the number of months between the assessments varied from 0.5 to 27 months. The first ROAG-J assessments were carried out between November 2011 and March 2014, and the subsequent (final) assessments were carried out between January 2012 and March 2014.

### Data Processing and Analysis

Frequency distributions for each item in the ROAG-J were reported. To compare change in the total score between the first and the final assessments, the Wilcoxon signed rank test was performed. Chi-square tests for independence were performed to test for associations with gender. The Kruskal-Wallis test was used to determine differences between grades. Spearman correlations were computed to evaluate associations between items within the two time periods. Nominal  $p$ -values of .05 were used. SPSS version 21.0 (PASW statistics, IBM Corporation, Armonk, NY) was used for the analysis.

### Ethical Aspects

The owner of the registry (Senior Alert) approved use of data for this study. It was treated as a quality improvement project within the organization. During the work, the Declaration of Helsinki (World Medical Association, 1964) was taken into account. Nursing homes, staff, and participants (all the data) were anonymous to the author. Participation in Senior Alert is voluntary and did not affect care in any way. Each individual received information about his or her legal rights relating to the registered data (Senior Alert, 2014). The data were collected as part of usual care, and no further permission for reuse was needed. Nursing staff members who carried out the assessments had been informed about the purpose of the data collection and that the material was going to be made available for research. The results have been presented to ensure that they are as fair, value free, and accurate as possible, and no addition

or omission of important information has been made—regardless of whether or not this would benefit Senior Alert.

## RESULTS

### Participant Characteristics

The assessments were based on 667 participants, most of them women (66.8%). The participants were between 65 and 104 years of age ( $M = 86.2$ ,  $SD = 7.7$ ). At the first assessment occasion, 22 (3.3%) assessments were performed by home care teams, and 84 (12.6%) assessments were performed by personnel working in short-term accommodations; 551 (82.6%) were obtained from residents of retirement accommodations; and 10 (1.5%) were made in LSS accommodation. At the final assessment, assessments obtained by home care teams ( $n = 17$ ; 2.5%) and personnel in short-term accommodations ( $n = 17$ ; 2.5%) decreased, whereas the number of assessments made in retirement accommodation increased to 623 (93.4%); 10 (1.5%) were made in LSS accommodation. The total number of individual ROAG-J assessments during the study period varied from 2 and 9 ( $Mdn = 2$ ).

### Oral Health

The number and percentage of identified oral health problems are shown for initial assessments in Table 2 and subsequent assessments in Table 3. The overall score showed that less than one third of the participants were considered to have oral problems or illnesses (i.e., scored Grades 2–3 in one or more of the oral health parameters, where most of the participants had 1–3 points in both occasions; Figure 1). Of these, teeth (coating, food debris generally, or broken teeth) and swallowing (minor or/and pronounced problems) were the most significant problems identified at both assessments and represented approximately 20% of the identified problems at the final assessment (Tables 2 and 3).

At the first assessment, 190 (28.5%) individuals were considered to have oral problems or illness according to the total oral health score (Figure 1). At the final assessment, the number of individuals considered to have problems had increased to 192 (28.8%). The total ROAG-J score at the first ROAG-J assessment ( $n = 187$ ) ranged from 2 to 18 out of 27 ( $M = 3.87$ ,  $SD = 2.82$ ). At the subsequent ROAG-J assessment ( $n = 191$ ), the ROAG-J score also ranged from 2 to 18 ( $M = 4.16$ ,  $SD = 3.11$ ; Figure 1). Comparisons between the first and the final assessment of ROAG-J total scores revealed no statistical significance. Analysis at the item level revealed no statistically significant differences between the first and the final assessments.

ROAG-J scores broken down by gender are shown in Tables 2 and 3. In the first assessment, women experienced more oral health impairments than men regarding the oral variable of tongue ( $p = .01$ ). In the subsequent assessment, women had more impairments than men for the oral

variables of voice ( $p = .05$ ), oral mucosa ( $p = .003$ ), tongue ( $p = .01$ ), and saliva ( $p = .006$ ).

Statistically significant relationships were found through comparisons of correlations between several variables (Table 4). Strong correlations in the relationships were found between oral mucosa and tongue (first assessment:  $r = .48$  and subsequent assessment:  $r = .57$ , respectively) and oral mucosa and saliva ( $r = .43$  and  $r = .54$ , respectively). A medium-strength relationship was found between tongue and saliva ( $r = .38$  and  $r = .47$ , respectively), gums and teeth ( $r = .03$  and  $r = .32$ , respectively), teeth and prostheses ( $r = -.31$  and  $r = -.41$ , respectively), and voice and saliva ( $r = .33$  and  $r = .30$ , respectively). The statistically significant correlations could be seen in both assessments but were slightly weaker in the first assessment.

## DISCUSSION

To our knowledge, this study is the first study evaluating the systematic use of the ROAG-J over time, in the daily nursing care of frail elderly individuals. The key finding of this study was that less than one third of the participants were considered to have oral health problems or illnesses—at the first assessment as well as at the subsequent assessment, when the ROAG-J was used. The most significant oral health problems identified in this study were related to teeth and swallowing.

The ROAG-J is used in frail elderly subjects when a change in the care needed can be assumed. By using the ROAG-J, it was possible to maintain stable oral health in frail elderly individuals, although their general health was likely to decline over time. In this study, we have reported that less than one third of the study population were considered to have oral health problems, and this varied between 3.2% (tongue) and 8% (swallowing) at the first assessment. In contrast to this study, Andersson et al. (2003) reported a high prevalence (86%) of elderly patients to have oral health problems. The authors also reported great variation in the prevalence of oral health problems—between 11% (saliva) and 39% (tongue). The Andersson et al.'s (2003) study was performed on a hospital ward and mainly involved patients who had suffered a stroke. In their study, the main result was an improvement in oral health; 86% had oral health problems at admission and only 51% at discharge, when using the ROAG-J. In this study, some of the participants had previous experience with elderly care before the first assessment. They may, therefore, already have received prevention or help with their oral health. This may explain the large number of participants with good oral health.

In this study, 5.1% (on admission) and 4.8% (on subsequent) of the participants had signs of hyposalivation. This is in contradiction with earlier studies, where the prevalence of hyposalivation was approximately 30% among those 65 years of age or greater (Nederfors, Isaksson, Mörnstad, & Dahlöf, 1997; Ship, Pillemer, & Baum, 2002). The discrepancies may be due to methodological differences in the studies,

**TABLE 2. Oral Health Problems at Admission Using Revised Oral Assessment Guide-Jönköping Assessment: Total Sample, Men, and Women**

Item/grade	Total (N = 667)		Women (n = 444)		Men (n = 223)		p	
	n	(%)	n	(%)	n	(%)	Gender <sup>a</sup>	Grade <sup>b</sup>
Lips							ns	ns
1	633	(94.9)	419	(94.7)	214	(96.0)		
2	31	(4.6)	23	(5.2)	8	(3.6)		
3	0	(0.0)	0	(0.0)	0	(0.0)		
Voice							ns	ns
1	616	(92.4)	407	(91.7)	209	(93.7)		
2	35	(5.2)	24	(5.4)	11	(4.9)		
3	13	(1.9)	11	(2.5)	2	(0.9)		
MM							ns	ns
1	633	(94.9)	417	(93.9)	216	(96.9)		
2	29	(4.3)	23	(5.2)	6	(2.7)		
3	2	(0.3)	2	(0.5)	0	(0.0)		
Tongue							.01	.007 <sup>c</sup>
1	642	(96.3)	422	(95.5)	220	(98.6)		
2	19	(2.8)	17	(3.8)	2	(0.9)		
3	3	(0.4)	3	(0.7)	0	(0.0)		
Gums							ns	ns
0	33	(4.9)	23	(5.2)	10	(4.5)		
1	605	(90.7)	405	(91.2)	200	(89.7)		
2	24	(3.6)	14	(3.2)	10	(4.5)		
3	2	(0.3)	0	(0.0)	2	(0.9)		
Teeth							ns	ns
0	146	(21.9)	96	(21.6)	50	(22.4)		
1	457	(68.5)	309	(69.6)	148	(66.4)		
2	51	(7.6)	33	(7.4)	18	(8.1)		
3	10	(1.5)	4	(0.9)	6	(2.7)		
Dentures							ns	ns
0	417	(62.5)	267	(60.1)	150	(67.3)		
1	222	(33.3)	165	(37.2)	57	(25.6)		
2	11	(1.6)	3	(0.7)	8	(3.6)		
3	14	(2.1)	7	(1.6)	7	(3.1)		
Saliva							ns	ns
1	630	(94.5)	416	(93.7)	214	(96.0)		
2	34	(5.1)	26	(5.9)	8	(3.6)		
3	0	(0.0)	0	(0.0)	0	(0.0)		
Swallow							ns	ns
0	0	(0.0)	0	(0.0)	0	(0.0)		
1	610	(91.5)	403	(90.8)	207	(92.8)		
2	39	(5.8)	26	(5.9)	13	(5.8)		
3	15	(2.2)	13	(2.9)	2	(2.7)		

Note. Nominal *p*-values of .05 were used to evaluate gender differences. Grade values are 0 = not relevant to assess, 1 = healthy or normal condition, 2 = moderate changes/deviations, and 3 = severe changes/deviations. MM = mucous membranes. <sup>a</sup> $\chi^2$  test. <sup>b</sup>Kruskal-Wallis test. <sup>c</sup>Difference: Grades 1 and 2.

such as who conducted the saliva test (dental or nursing professionals), how the saliva test was performed, and also as a result of different populations. When comparing gender, women experienced more oral health problems than men. A higher prevalence of hyposalivation among women compared with men has been shown in earlier studies (Flink, Bergdahl, Tegelberg, Rosenblad, & Lagerlöf, 2008), and this could be due to physical causes (Inoue et al., 2006)

or medication (Loikas, Wettermark, von Euler, Bergman, & Schenck-Gustafsson, 2013). This could not be investigated in the current study because data on health and medication were not available. In contrast to this study, Andersson et al. (2003) did not detect any gender differences in the prevalence of hyposalivation. By continuing to use the instrument, the staff can become more skilled at finding oral health problems over time. It is also possible that the participants' oral

**TABLE 3. Oral Health Problems on Subsequent Occasions Using Revised Oral Assessment Guide-Jönköping Assessment: Total Sample, Men, and Women**

Item/grade	Total (N = 667)		Women (n = 444)		Men (n = 223)		p	
	n	(%)	n	(%)	n	(%)	Gender <sup>a</sup>	Grade <sup>b</sup>
Lips							ns	ns
1	642	(96.3)	427	(96.8)	215	(96.4)		
2	22	(3.3)	14	(3.2)	8	(3.6)		
3	1	(0.1)	1	(0.2)	0	(0.0)		
Voice							.05	.05 <sup>c</sup>
1	619	(92.8)	408	(91.9)	211	(94.6)		
2	27	(4.0)	18	(4.1)	9	(4.0)		
3	14	(2.1)	14	(3.2)	0	(0.0)		
MM							.003	.03 <sup>d</sup>
1	624	(93.6)	406	(91.4)	218	(97.7)		
2	37	(5.5)	32	(7.2)	5	(2.2)		
3	4	(0.6)	4	(0.9)	0	(0.0)		
Tongue							.01	.002 <sup>e</sup>
1	634	(95.1)	415	(93.4)	219	(98.2)		
2	29	(4.3)	25	(5.6)	4	(1.8)		
3	2	(0.3)	2	(0.5)	0	(0.0)		
Gums							ns	ns
0	50	(7.5)	38	(8.6)	12	(5.4)		
1	589	(88.3)	388	(87.4)	201	(90.1)		
2	20	(3.0)	13	(2.9)	7	(3.1)		
3	6	(0.9)	3	(0.7)	3	(1.3)		
Teeth							ns	ns
0	154	(23.1)	106	(23.9)	48	(21.5)		
1	443	(66.4)	295	(66.4)	148	(66.4)		
2	52	(7.8)	30	(6.7)	22	(9.9)		
3	16	(2.4)	11	(2.5)	5	(2.2)		
Dentures							ns	ns
0	407	(61.0)	261	(58.8)	146	(65.5)		
1	233	(35.0)	167	(37.6)	66	(29.6)		
2	9	(1.3)	6	(1.4)	3	(1.3)		
3	16	(2.4)	8	(1.8)	8	(3.6)		
Saliva							.006	.003 <sup>f</sup>
1	631	(94.6)	412	(92.8)	219	(98.2)		
2	32	(4.8)	29	(6.5)	3	(1.3)		
3	2	(0.3)	1	(0.2)	1	(0.4)		
Swallow							ns	ns
0	4	(0.6)	4	(0.9)	0	(0.0)		
1	591	(88.6)	387	(87.2)	204	(91.5)		
2	54	(8.1)	41	(9.2)	13	(5.8)		
3	16	(2.4)	10	(2.3)	6	(2.7)		

Note. Nominal *p*-values of .05 were used to evaluate gender differences. Grade values are 0 = not relevant to assess, 1 = healthy or normal condition, 2 = moderate changes/deviations, and 3 = severe changes/deviations. MM = mucous membranes. <sup>a</sup> $\chi^2$  test. <sup>b</sup>Kruskal-Wallis test. <sup>c</sup>Difference: Grades 2 and 3. <sup>d</sup>Difference: Grades 1 and 2. <sup>e</sup>Difference: Grades 1 and 2. <sup>f</sup>Difference: Grades 1 and 2.

health would have been further impaired at the subsequent assessment without assessments and recommended preventive action.

Nursing staff trained in the ROAG-J performed the assessments, but the number of people making the assessments is unknown. This is in contrast to Andersson et al. (2003), where 10 trained and calibrated registered nurses performed the

ROAG-J assessments. The training and calibration of the nurses and the fact that they were fewer in number could have had an impact on the results. This may also have influenced the reliability. Another bias could be underreporting due to uncertainty when examining the mouths and discomfort when performing oral hygiene on elderly people (Wårdh et al., 1997). In the study by Ribeiro et al. (2014), the

First	Score	Subsequent
0	25-27	0
0	22-24	0
0	19-21	0
1	16-18	4
3	13-15	0
6	10-12	7
14	7-9	13
54	4-6	61
109	1-3	104
480	0	478
<i>M</i> = 3.87		<i>M</i> = 4.16
<i>SD</i> = 2.82		<i>SD</i> = 3.11

**FIGURE 1.** Revised Oral Assessment Guide-Jönköping score distributions at first and subsequent assessments.

authors underlined the importance of trained healthcare workers in order to improve the sensitivity of the results for the different variables included in the ROAG-J instrument. However, the results indicated good oral health for most of the elderly people who had already been measured at the first assessment, and this may also be explained by good strategies for oral health promotion and prevention within the care for the elderly in the studied municipality. This may indicate possible regional differences in oral health strategies for frail and ill elderly people, suggesting that it is important to have clear strategies when working with the oral health of institutionalized elderly groups.

Relationships were found between some of the items. The occurrence of problems of the oral mucosa, for example, indicated a higher risk of impairment in the variables of tongue and saliva. Nursing staff awareness of relationships between the items could lead to more reliable assessments, where the caregiver is more meticulous in conducting the

examination. However, some of the findings may reflect methodological bias. A negative correlation between teeth and prostheses would be of greater clinical relevance if there had also been a negative correlation between gums and prostheses. At the subsequent assessment of gums, an increase in the frequency of scores of Grade 0 (no gums, only oral mucosa) was seen. The same increase should have been visible in the score frequency for teeth, grade = 0 (no natural teeth). This may indicate that some members of the nursing staff did not have enough knowledge to perform ROAG-J assessments and fill in the forms correctly. This once again confirms the importance of strengthening the validity of the registry information in terms of sensitivity and specificity through good knowledge and trained staff working with the ROAG-J (Ribeiro et al., 2014).

When considering the results in relation to earlier studies, the ROAG-J can be seen as an important tool for evaluating the oral health of elderly people in order to both maintain functioning strategies and improve oral health—which other studies have also confirmed (Andersson et al., 2002, 2003; Ribeiro et al., 2014). The results in this study are based on registry data obtained from daily assessment activities in elderly care and, as a result, may differ from those obtained in research studies based on more controlled methods. However, an evaluation of implemented strategies for oral care in elderly people is very important and would generate new and different knowledge—which may be especially useful for quality improvement purposes. On the basis of this and other studies in the field, we believe and suggest that the training of all nursing staff should continue. However, to ensure high validity, we suggest that this should be supplemented by identifying nursing staff members from each ward to be given more frequent and in-depth training in the area of oral health and the ROAG-J by dental professionals to ensure that the staff members have enough knowledge and ability to perform a ROAG-J assessment. By using a tool, such as ROAG-J, to assess various aspects of health and risk to health, it is possible to

**TABLE 4.** Correlations Among Revised Oral Assessment Guide-Jönköping Items on Admission and Subsequent Assessment

Item	1	2	3	4	5	6	7	8	9
1. Voice	–	.25	.21**	.17**	–.03	.06	–.04	.33**	.25**
2. Lips	.22**	–	.12**	.20**	.03	.03	.04	.25**	.23**
3. Mucous membranes	.24**	.26**	–	.48**	.13**	.16**	.01	.43**	.17**
4. Tongue	.21**	.27**	.57**	–	.04	.07	.02	.38**	.07
5. Gums	.07	.02	.15**	.13**	–	.26**	–.08*	.01	–.07
6. Teeth	–.07	.01	.17**	.07	.32**	–	–.31**	.05	.01
7. Dentures	.05	.01	–.02	.00	–.19**	–.41	–	.04	–.05
8. Saliva	.30**	.26**	.54**	.47**	.04	.03	.01	–	.21**
9. Swallow	.25**	.23**	.22**	.14**	.03	.03	–.04	.20**	–

Note. *n* = 664 (on admission); *n* = 665 (subsequent assessment). Admission correlations are above the diagonal; correlations from subsequent assessments are below the diagonal. \**p* < .05. \*\**p* < .01.

create good conditions for collaboration between different professions (nursing, dentistry) who otherwise might not do so directly.

This study was longitudinal in design, with a large number of participants. This study showed that further research in the field and the continuous monitoring and evaluation of the use of the ROAG-J instrument in practice are needed. Evaluations of standardized assessment programs are needed when time, money, and effort are utilized.

## Conclusion

The registry assessments made by nursing staff using the ROAG-J showed that use of this tool in daily nursing care of elderly people receiving care services can reveal deviations from oral health standards. Knowledge of oral health conditions and the ROAG-J instrument can be important and useful to maintain and prevent oral health for frail institutionalized individuals. Knowledge about oral health and regular training in assessment techniques—supported by dental personnel—is needed. When implementing new assessment strategies, such as use of the ROAG-J, evaluation is important to clarify the knowledge and the ability to apply it in daily nursing care and bring about further quality improvement in oral care practices for frail elderly people receiving services.

Accepted for publication January 26, 2016.

The authors acknowledge that funding was provided by School of Health and Welfare, Jönköping University, Jönköping, Sweden.

The authors wish to thank the representatives of Senior Alert data register and nursing staff involved in the retirement homes.

The authors have no conflicts of interest to report.

Corresponding author: Ulrika Lindmark, RDH, MSc, PhD, School of Health and Welfare, Jönköping University, P.O. Box 1026, SE-551 11 Jönköping, Sweden (e-mail: [ulrika.lindmark@ju.se](mailto:ulrika.lindmark@ju.se)).

## REFERENCES

- Ahlqwist, M., Bengtsson, C., Hakeberg, M., & Hägglin, C. (1999). Dental status in women in a 24-year longitudinal and cross-sectional study. Results from a population study of women in Göteborg. *Acta Odontologica Scandinavica*, *57*, 162-167. doi:10.1080/000163599428904
- Andersson, P. (2004). *Assessments of oral health status in frail patients in hospital*. Doctoral dissertation, Faculty of Odontology, Malmö University, Malmö, Sweden. Retrieved from <https://dspace.mah.se/handle/2043/7926>
- Andersson, P., Hallberg, I. R., Lorefält, B., Unosson, M., & Renvert, S. (2004). Oral health problems in elderly rehabilitation patients. *International Journal of Dental Hygiene*, *2*, 70-77. doi:10.1111/j.1601-5029.2004.00073.x
- Andersson, P., Hallberg, I. R., & Renvert, S. (2002). Inter-rater reliability of an oral assessment guide for elderly patients residing in a rehabilitation ward. *Special Care in Dentistry*, *22*, 181-186. doi:10.1111/j.1754-4505.2002.tb00268.x
- Andersson, P., Hallberg, I. R., & Renvert, S. (2003). Comparison of oral health status on admission and at discharge in a group of geriatric rehabilitation patients. *Oral Health & Preventive Dentistry*, *1*, 221-228.
- Eilers, J., Berger, A. M., & Petersen, M. C. (1988). Development, testing, and application of the oral assessment guide. *Oncology Nursing Forum*, *15*, 325-330.
- Flink, H., Bergdahl, M., Tegelberg, Å., Rosenblad, A., & Lagerlöf, F. (2008). Prevalence of hyposalivation in relation to general health, body mass index and remaining teeth in different age groups of adults. *Community Dentistry and Oral Epidemiology*, *36*, 523-531. doi:10.1111/j.1600-0528.2008.00432.x
- Inoue, H., Ono, K., Masuda, W., Morimoto, Y., Tanaka, T., Yokota, M., & Inenaga, K. (2006). Gender difference in unstimulated whole saliva flow rate and salivary gland sizes. *Archives of Oral Biology*, *51*, 1055-1060. doi:10.1016/j.archoralbio.2006.06.010
- Kiyak, H. A. (2000). Successful aging: Implications for oral health. *Journal of Public Health Dentistry*, *60*, 276-281. doi:10.1111/j.1752-7325.2000.tb03335.x
- Lindqvist, L., Seleskog, B., Wårdh, I., & von Bültzingslöwen, I. (2013). Oral care perspectives of professionals in nursing homes for the elderly. *International Journal of Dental Hygiene*, *11*, 298-305. doi:10.1111/idh.12016
- Loikas, D., Wettermark, B., von Euler, M., Bergman, U., & Schenck-Gustafsson, K. (2013). Differences in drug utilisation between men and women: A cross-sectional analysis of all dispensed drugs in Sweden. *BMJ Open*, *3*. doi:10.1136/bmjopen-2012-002378
- Ministry of Health and Social Affairs. (1993). *The act on support and service for persons with certain functional impairments* (Swedish Code of Statutes SFS 1993:387). Stockholm, Sweden: Swedish Parliament. Retrieved from [www.independentliving.org/docs3/englss.html](http://www.independentliving.org/docs3/englss.html)
- Murray Thomson, W. (2014). Epidemiology of oral health conditions in older people. *Gerodontology*, *31*, 9-16. doi:10.1111/ger.12085
- National Board of Health and Welfare. (2012). *Äldre—vård och omsorg den 1 April 2012—Kommunala insatser enligt socialtjänstlagen samt hälso-och sjukvårdslagen [The elderly—Health and social care April 1, 2012—Municipality efforts under the Social Services Act and the Health Care Law]*. Retrieved from <http://www.socialstyrelsen.se/publikationer2012/2012-10-19>
- Nederfors, T., Isaksson, R., Mörnstad, H., & Dahlöf, C. (1997). Prevalence of perceived symptoms of dry mouth in an adult Swedish population—Relation to age, sex and pharmacotherapy. *Community Dentistry and Oral Epidemiology*, *25*, 211-216. doi:10.1111/j.1600-0528.1997.tb00928.x
- Nitschke, I., & Müller, F. (2004). The impact of oral health on the quality of life in the elderly. *Oral Health & Preventive Dentistry*, *2*, 271-275.
- Norderyd, O., Koch, G., Papias, A., Köhler, A. A., Helkimo, A. N., Brahm, C. O., . . . Frisk, F. (2015). Oral health of individuals aged 3-80 years in Jönköping, Sweden during 40 years (1973-2013). II. Review of clinical and radiographic findings. *Swedish Dental Journal*, *39*(2), 69-86.
- Pacific Center for Special Care. (2015). *MDS oral health assessment tool for nurses*. Retrieved from [http://dental.pacific.edu/Community\\_Involvement/Pacific\\_Center\\_for\\_Special\\_Care\\_\(PCSC\)/Education/\\_MDS\\_Oral\\_Health\\_Assessment\\_Tool.html](http://dental.pacific.edu/Community_Involvement/Pacific_Center_for_Special_Care_(PCSC)/Education/_MDS_Oral_Health_Assessment_Tool.html)
- Paulsson, G., Wårdh, I., Andersson, P., & Öhrn, K. (2008). Comparison of oral health assessments between nursing staff and patients on medical wards. *European Journal of Cancer Care*, *17*, 49-55. doi:10.1111/j.1365-2354.2007.00802.x
- Petersen, P. E., Kandelman, D., Arpin, S., & Ogawa, H. (2010). Global oral health of older people—Call for public health action. *Community Dental Health*, *27*, 257-268.
- Petersen, P. E., & Yamamoto, T. (2005). Improving the oral health of older people: The approach of the WHO Global Oral Health Programme. *Community Dentistry and Oral Epidemiology*, *33*, 81-92. doi:10.1111/j.1600-0528.2004.00219.x
- Ribeiro, M. T. F., Ferreira, R. C., Vargas, A. M. D., & Ferreira, E. F. (2014). Validity and reproducibility of the revised oral assessment

- guide applied by community health workers. *Gerodontology*, 31, 101–110. doi:10.1111/ger.12014
- Senior Alert. (2014). *Senior alert—More than just a quality register*. Retrieved from <http://plus.rjl.se/infopage.jsf?nodeId=43617>
- Senior Alert. (2015). *Riskbedömning Munhälsa. Manual (only in Swedish) [Risk Assessment Oral health. Manual]*. Retrieved from [http://plus.rjl.se/info\\_files/infosida43207/riskbeomning\\_ROAG\\_version\\_2015\\_01\\_01.pdf](http://plus.rjl.se/info_files/infosida43207/riskbeomning_ROAG_version_2015_01_01.pdf)
- Ship, J. A., Pillemer, S. R., & Baum, B. J. (2002). Xerostomia and the geriatric patient. *Journal of the American Geriatrics Society*, 50, 535–543. doi:10.1046/j.1532-5415.2002.50123.x
- Statistics Sweden. (2010). *Befolkningspyramiden för Sverige 2010 [The population pyramid for Sweden in 2010]*. Stockholm, Sweden: National Center of Statistics. Retrieved from <http://www.scb.se/sv/Hitta-statistik/Artiklar/Befolkningspyramiden-har-blivit-ett-torn/>
- Strömberg, E., Hagman-Gustafsson, M.-L., Holmén, A., Wårdh, I., & Gabre, P. (2012). Oral status, oral hygiene habits and caries risk factors in home-dwelling elderly dependent on moderate or substantial supportive care for daily living. *Community Dentistry and Oral Epidemiology*, 40, 221–229. doi:10.1111/j.1600-0528.2011.00653.x
- Wårdh, I., Andersson, L., & Sörensen, S. (1997). Staff attitudes to oral health care: A comparative study of registered nurses, nursing assistants and home care aides. *Gerodontology*, 14, 28–32. doi:10.1111/j.1741-2358.1997.00028.x
- Willumsen, T., Karlsen, L., Næss, R., & Bjørntvedt, S. (2012). Are the barriers to good oral hygiene in nursing homes within the nurses or the patients? *Gerodontology*, 29, e748–e755. doi:10.1111/j.1741-2358.2011.00554.x
- World Health Organization. (2006). *Oral health in aging societies: Integrating oral health and general health* (Report of a meeting convened at the WHO Centre for Health Development in Kobe, Japan, June 1–3, 2005). Geneva, Switzerland: Author. Retrieved from [http://www.who.int/oral\\_health/events/Oral%20health%20report%202.pdf](http://www.who.int/oral_health/events/Oral%20health%20report%202.pdf)
- World Medical Association. (1964). *Declaration of Helsinki—Ethical principles for medical research involving human subjects*. Retrieved from <http://www.wma.net/en/30publications/10policies/b3/>

### **Call for Papers: Biology Reviews for Nursing Research**

*Nursing Research* invites integrative reviews of current advances in basic biological sciences and translational research relevant to emerging areas of nursing science. Areas of interest include but are not limited to topics in: genetics, genomics, and epigenetics; systems biology/integrative physiology; neuroscience and imaging; computational biology; microbiology and the human microbiome; nanoscience; physiology *in situ* and mobile health devices. Biology Reviews for Nursing Research will provide up-to-date information about advances in these thematic areas to the global community of nurse scientists, with the aim of infusing new biological and “omics” knowledge into nursing research.

Reviews should summarize and critically evaluate the current state of knowledge. Implications for nursing research in relevant areas should be addressed, especially with respect to the priority research addressing prevention and treatment of disease and disability; symptoms and symptom management of acute and chronic illnesses; interventions for compassionate end-of-life and palliative care; infectious disease and global health; and integration of biological and behavioral perspectives on health over the lifespan across priority areas.

Papers accepted for Biology Reviews will be published as features in regular issues of *Nursing Research*.

Queries are encouraged and should be sent to Dr. Susan J. Henly, Editor ([henly003@umn.edu](mailto:henly003@umn.edu)).

Information for Authors is available at: [http://journals.lww.com/nursingresearchonline/\\_layouts/1033/oaks.journals/informationforauthors.aspx](http://journals.lww.com/nursingresearchonline/_layouts/1033/oaks.journals/informationforauthors.aspx). *Nursing Research* is indexed or abstracted in Medline, CINAHL, JCR Science Citation Index, PsychInfo and Thomson Reuters Web of ScienceSM.