



## The association between education received and working hours of nurses with knowledge, attitude, and practice regarding the oral health of elderly in retirement homes

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### ABSTRACT

**Introduction and Aims:** Elderly people living in retirement homes are at higher risk of oral and maxillofacial diseases. Evidence has shown a clear relationship between poor oral health and possibility of aspiration pneumonia and gastrointestinal bleeding in old patients.

**Aim:** The aim of this study was to determine the association between education received and working hours of nurses with their knowledge, attitude, and practice regarding the oral health of elderly in retirement homes.

**Materials and Methods:** In this analytical study conducted in 2021 in Tehran, nurses working in retirement homes were invited to complete a questionnaire including demographics, knowledge (8 questions), attitude (7 questions), practice (10 questions) and barriers (1 question). The results were analyzed with SPSS-25 using linear regression.

**Results:** The mean age of the participants (n=78) was 40.28±8.9 years and 53.8% were female. Lack of cooperation among elders (56.4%) as well as lack of time (41.0%) were the most important barriers to oral health maintenance. Receiving education as a nurse/caregiver had positive relationship with the scores of knowledge, attitude, and practice. Age, frequency of regular dental visits and working time per week were significantly associated with practice.

**Conclusion:** Education received as a nurse/caregiver was an important predictor of oral health knowledge, attitude, and practice of nurses regarding elders. Due to the importance of oral health in general health of elderly, planning is needed to provide continuing education for nurses to oral health care and maintenance in older people.

**Keywords:** Attitude; Elderly; Knowledge; Oral health; Practice.

### Introduction

The world's population is ageing rapidly [1]. It is estimated that the elderly aged above 60 years will outnumber children aged 0-14 years by 2050 [2]. Due to extended life expectancy and improvements in oral health promotion programs targeted general population,

more people preserve their own natural teeth through old age. Consequently, there is an increasing demand for elderly care, in all aspects of health, including oral health [3].

Retirement home residents are considered to have lower level of oral health compared to community dwelling elderly [4]. Both clinical and subjective aspects of oral health related quality of life (OHRQoL) is considerably affected by tooth loss especially when functional dentition is involved [5]. Chewing disability, pain and discomfort in mouth and teeth, bleeding gums, dry mouth, difficulty in: eating, speaking, cleaning teeth or dentures, sleeping and resting, together with related psychosocial problems such as low self-esteem and well being are some of the challenges elderly people face in their daily life related to diminished OHRQoL [3,4].

Poor oral hygiene is a predisposing factor for a number of serious diseases and conditions similar to aspiration pneumonia, malnutrition, and cardiac disease [6-9]. Loss of functional teeth i.e. functional occlusal units, is also associated with cognitive impairments in elderly [5,11]. Many elderly people live in retirement homes where their oral health is often neglected or given lower priority [12]. A high prevalence of untreated caries, chronic periodontitis, and candidiasis is reported in these residents; furthermore, poor access to and low utilization of dental services are major barriers to maintain good oral health [13]. Most of the retirement home dwellers are unable to perform their daily activities including oral hygiene; therefore, caregivers should provide the necessary assistance. Nurses should have the required knowledge and skills to be able to maintain and improve the elderly people's oral hygiene [14]. The present study was conducted to determine the association between education received and working hours of nurses with their knowledge, attitude, and practice regarding the oral health of elderly in retirement homes.

## Materials and Methods

The nurses/caregivers working in retirement homes in Tehran were invited to participate in a cross-sectional study in 2021. The study was conducted from May to the end of June. Nurses/caregivers who took care of the elderly in retirement homes as a full-time or part-time job and were willing to participate in the study were included. Exclusion criteria were temporary (not regular) presence in the retirement home and reluctance to participate. Retirement homes were selected using stratified random sampling, and stratification was done according to the geographical location of retirement homes (north, south, east, west, and center of Tehran). Retirement homes were selected from each stratum using simple randomization. In each retirement home,

the nurses/caregivers were selected using census sampling. The sample size (n) required for this study was determined using PAS 11 software, significance level was set at  $\alpha=0.05$  with 95% confidence interval and  $\beta=0.2$ , for assessment of the simultaneous effects of 10 variables,  $R1=0.2$  and  $R0=0$  were considered. The final required sample size was 78.

A 37-item researcher-made questionnaire which was developed based on the available literature [1,21] was applied to evaluate the nurses/caregivers' self-reported knowledge, attitude, and practice. The validity of questionnaire was assessed regarding the necessity, relevance, simplicity and transparency of the questions by ten faculty members and specialists of the School of Dentistry, Tehran University of Medical Sciences, in the fields of oral and maxillofacial diseases, prosthodontics, and community oral health. Content Validity Index (CVI) and Content Validity Ratio (CVR) were calculated. CVR equal or more than 0.79 was considered acceptable for each question. To evaluate the reliability of the questionnaire, it was administered to 10 nurses/caregivers twice, one week apart. Analysis showed a weighted kappa coefficient of above 0.8 for all items.

The questionnaire included 8 questions on knowledge (scoring of answers: 0 for incorrect, 1 for correct), 7 questions on attitude (answers arranged as five point Likert scale, scoring: 1 for no idea, 2 for Completely disagree, 3 for Disagree, 4 for Agree, 5 for Completely agree), 10 questions on practice (scoring of answers: 0 for incorrect, 1 for correct), and 1 open answer question on barriers. Participation in the study was voluntary and the participants were asked to answer the questions freely. The data were analyzed with the SPSS software version 25 using linear regression analysis. The correlations between the scores of knowledge, attitude, and practice were evaluated using the Pearson's correlation coefficient.

## Results

Seventy-eight nurses/caregivers, including 42 females (53.8%) and 37 males (46.2%), from 15 retirement homes were selected and evaluated. The mean age of the participants was  $40.28 \pm 8.9$  years, ranging from 27 to 59 years. Most of the nurses/ caregivers ( $n=27$ ) took care of at least 10 dependent elderly people. Tables 1 and 2 show the demographic variables of the study participants. Table 3 presents the frequency of the nurses'/caregivers' responses to questions assessing knowledge about oral health. Table 4 shows the frequency

of the nurses'/caregivers' responses to questions assessing attitude towards oral health. Table 5 described the frequency of the nurses'/caregivers' responses to questions assessing oral health practice. Each correct answer to knowledge, attitude, and practice questions was assigned a score of one, and the total scores of these domains were calculated by summing the scores of the related questions. The mean scores of the knowledge, attitude, and practice of the participants towards the oral hygiene of the elderly was  $4.96 \pm 1.85$  (range: 0 to 8),  $27.69 \pm 3.77$  (range: 5 to 35), and  $9.46 \pm 1.36$  (range: 0 to 10), respectively.

According to the Pearson's correlation test, a significant correlation was found between the scores of knowledge and attitude ( $r=0.361$ ,  $p<0.001$ ), knowledge and practice ( $r=0.265$ ,  $p<0.02$ ), and attitude and practice ( $r=0.289$ ,  $p<0.01$ ). Table 6 presents the results of regression analysis for determining the effects of different variables on the knowledge score of the nurses/caregivers regarding the oral health of the elderly. According to the results, among different variables including age, sex, education level, work experience, number of working hours per week, number of workdays per week, education received as a caregiver, number of elderly receiving care, number of dependent elderly with personal care needs, and frequency of dental visits, it was found that age ( $p<0.016$ ) and education received

as a caregiver ( $p<0.001$ ) had significant effects on predicting the knowledge scores of the nurses/caregivers. Those nurses/caregivers who were older and had received more related education, had better knowledge. Table 7 presents the results of regression analysis for determining the effects on different variables on the attitude score. It was found that education received as a nurse/ caregiver ( $p<0.002$ ) and frequency of dental visits ( $p<0.001$ ) had significant direct effects on predicting the attitude score. Table 8 presents the results of regression analysis for determining the effects on different variables on the practice score of the nurses/caregivers. According to the results, age ( $p=0.062$ ), number of working hours per week ( $p<0.001$ ), education received as a caregiver ( $p<0.001$ ), and frequency of dental visits ( $p<0.029$ ) had significant effects on predicting the practice score of the nurses/caregivers regarding the oral hygiene of the elderly. Age, education received as a caretaker, and frequency of dental visits had direct effects while the number of working hours per week had an inverse effect on the practice score. Elderly people's lack of cooperation as well as lack of time and facilities was the most important barriers to oral health maintenance in the elderly.

Table 1. Frequency of categorical demographic variables in nurses/caregivers (n=78).

Variable	Categories	N	%
Level of education	Illiterate	4	5.1
	less than high school diploma	25	32.1
	diploma/associate	33	42.3
	bachelor/master or higher	16	20.5
Number of working days per week	Two	2	2.6
	Three	25	32.1
	Four	32	41
	Five	8	10.3
	Sex	5	6.4
Received education as a nurse/caregiver	Seven	6	7.7
	Yes	65	83.3
Frequency of dental visits	No	13	16.7
	Twice a year/more	14	17.9
	Once a year	19	24.4
	Visit on demand	42	53.8
Frequency of daily tooth brushing	None	3	3.8
	Less than once a day	4	5.1
	Once a day	39	50
	Twice a day	27	34.6
	More	8	10.3

Table 2. Mean (SD), minimum and maximum of quantitative demographic variables in nurses/caregivers (n=78).

Variable	Mean	SD	Min	Max
Age	40.28	8.9	27	59
Work experience (year)	10.22	7.21	1	27
Working hours per week	80.53	22.45	30	168
Working days per week	4.09	1.22	2	7
Number of elders under care	17.31	7.0	5	42
Number of dependent elders under care	13.94	5.65	4	28

Table 3. Answers to the questions of knowledge about oral health by nurses/caregivers (n=78).

Questions	Answers	N	%
Teeth will be ... by age	- Decayed or loosen and lost.	35	44.9
	- Kept until the end of life by good oral hygiene *	43	55.1
	- I don't know	0	0
Good oral hygiene in elderly ...	- Will affect their general health *	71	91
	- Won't affect their general health	5	6.4
	- I don't know	2	2.6
Natural teeth/ denture of elderly ...	- Should be brushed daily under the supervision of nurse/ caregiver. *	38	48.7
	- Shouldn't be brushed daily, weekly brushing is enough.	0	0
	- Sometimes should be brushed.	9	11.5
	- Should be brushed after each meal.	30	38.5
	- I don't know	1	1.3
What is the correct way of brushing for elderly?	- Horizontal	27	34.6
	- Vertical	20	25.6
	- Rolling	27	34.66
	- Vibrating	3	3.8
	- The simplest method for them *	35	44.8
	- I don't know	3	3.8
Which item is correct about brushing teeth/ cleaning dentures for elderly	- All the elderly must brush their teeth or cleaning dentures regardless of dependency, and the nurse/ caregiver must supervise.	15	19.2
	- If the elderly is dependent, nurse/ caregiver must help in brushing their teeth or cleaning dentures. *	58	74.4
	- There is no possibility to help elderly in tooth brushing or denture cleaning.	3	3.8
	- I don't know.	2	2.6
Which of the items is correct about using toothpaste in dentate elderly?	- They should always brush their teeth with toothpaste.	25	32.1
	- In some cases, such as sores in the mouth or burning sensation, toothpaste can not be used. *	35	44.9
	- I don't know.	18	23.1
Which item is correct about dentures?	- It should be taken out of the mouth for hours a day.	10	12.8
	- It should be taken out of the mouth at night. *	63	80.8
	- There is no need to be taken out at night.	5	6.7
	- I don't know.	0	0
How is the frequency of dental check ups in elderly?	- At least once a year *	23	29.5
	- At least twice a year	30	38.5
	- Visit when a problem occurs	17	21.8
	- I don't know.	8	10.3

Table 4. Answers to the questions of attitude about oral health by nurses/caregivers (n=78).

Questions	Answers	N	%
Keeping the teeth, gums and dentures of older people clean affects their general health.	Completely disagree	0	0
	No idea	1	1.3
	Disagree	4	5.1
	Agree	35	44.9
	Completely agree	38	48.7
Nurses should clean/assist in or monitor cleaning the natural teeth or dentures of the elderly on a daily basis.	Completely disagree	0	0
	No idea	1	1.3
	Disagree	9	11.5
	Agree	40	51.3
	Completely agree	28	35.9
I have enough skills to clean natural teeth/dentures of the elderly.	Completely disagree	0	0
	No idea	5	6.4
	Disagree	12	15.4
	Agree	38	48.7
	Completely agree	23	29.5
Cleaning the natural teeth/dentures of the elderly is part of my responsibilities.	Completely disagree	2	2.6
	No idea	7	9
	Disagree	14	17.9
	Agree	35	44.9
	Completely agree	20	25.6
My colleagues at this center care about cleaning the natural teeth/dentures of the elderly.	Completely disagree	0	0
	No idea	0	0
	Disagree	23	29.5
	Agree	40	51.3
	Completely agree	15	19.2
If I encounter a problem such as lack of time, cooperation or facilities, I will still do my best to take care of the natural teeth/ dentures of the elderly.	Completely disagree	0	0
	No idea	10	12.8
	Disagree	12	15.4
	Agree	42	53.8
	Completely agree	14	17.9
Brushing natural teeth/dentures of the elderly should be my responsibility.	Completely disagree	2	2.6
	No idea	13	16.7
	Disagree	18	23.1
	Disagree	29	37.2
	Completely agree	16	20.5

Table 5. Answers to the questions of practice on oral health by nurses/caregivers (n=78).

Questions	Answers	N	%
To maintain and improve the health of the elderly, I help them clean their natural teeth/denture.	Yes *	77	98.7
	No	1	1.3
I brush their teeth or clean their denture:	At least once a day *	38	48.7
	At least twice a day	8	10.3
	More than twice a day	5	6.4
	Sometimes	26	33.3
	Never	1	1.3
I spend ... time daily to clean the natural teeth/denture of the elderly. of the elderly.	At least 2 minutes	17	21.8
	3-5 minutes	21	26.9
	More than 5 minutes	8	10.3
	Depends on the situation *	31	39.7
	None	1	1.3
Which one do you use to clean the natural teeth of the elderly?	Brush and toothpaste *	70	89.7
	Mouth rinse	26	33.3
	Salt water	28	35.8
	Dental floss	8	10.2
	Toothpick	6	7.6
	None	1	1.28
I clean their dentures with ...	Something else	2	2.5
	Toothpaste	52	66.6
	Dishwashing liquid	8	10.2
	Liquid soap *	7	8.9
	None	9	11.5
I clean their denture with a ... toothbrush.	Something else	9	11.5
	Soft *	30	38.5
	Medium	39	50
	Rough	8	10.3
I clean their denture with ... water.	None	1	1.3
	Cold	13	16.7
	Warm	2	2.6
	Lukewarm *	62	79.5
I supervise them to take their dentures out of their mouths at night.	None	1	1.3
	Yes *	71	91
I keep their dentures in a container of lukewarm water after cleaning, overnight.	No	7	9
	Yes *	70	89.7
If you see an abnormal condition in their mouth such as a wound, infection or lesion, you will have an oral examination by a dentist as soon as possible.	No	8	10.3
	Yes *	76	97.4
	No	2	2.6

**Table 6.** Results of regression analysis on the relationship between age, education and knowledge of nurses/caregivers (n=78).

Independent variable	Unstandardized coefficients		Standardized coefficients $\beta$	T	P-value
	B	Std. error			
Age	0.04	0.01	0.25	2.45	0.01
Education as nurse/caregiver	0.47	0.12	0.37	3.64	0.00

**Table 7.** Results of regression analysis on the relationship between age, education and attitude of nurses/caregivers (n=78).

Independent variable	Unstandardized coefficients		Standardized coefficients $\beta$	T	P-value
	B	Std. error			
Education as nurse/caregiver	0.84	0.26	0.32	3.20	0.00
Frequency of dental visits	1.62	0.42	0.38	3.80	0.00

**Table 8.** Results of regression analysis on the relationship between age, education and attitude of nurses/caregivers (n=78).

Independent variable	Unstandardized coefficients		Standardized coefficients $\beta$	T	P-value
	B	Std. error			
Avg	0.029	0.015	0.189	1.89	0.06
Weekly working hours	-0.021	0.006	-0.344	-3.52	0.00
Education as nurse/caregiver	0.354	0.099	0.352	3.57	0.00
Frequency of dental visits	0.357	0.16	0.219	2.22	0.02

## Discussion

According to the results of the present study, nurses/caregivers working in retirement homes had an acceptable knowledge of geriatric oral health. The majority of the participants knew that it was possible to keep the teeth for a lifetime by maintaining oral hygiene; almost all of them knew that keeping teeth/dentures clean had a profound effect on the general health of the elderly, and most knew that dependent elders required assistance for brushing their teeth and that dentures should be removed at night. According to a study by Stancic et al [15], nurses/caregivers had acceptable knowledge of oral hygiene, which was consistent with our results. The nurses mostly acquired the knowledge through work experience. Thean et al [14] evaluated the oral health knowledge of the staff of a local retirement home in Singapore. The results showed that almost all of the staff believed that oral health was important for the elderly, which was similar to our findings. The results of this study showed that almost all the participants had a positive attitude towards the importance of oral health for older people. The majority of the nurses/caregivers stated that cleaning teeth/dentures was part of their duties. However, most of them believed that cleaning teeth/dentures should not be their responsibility. This finding may indicate the

importance of determining the details of duties and supervisions for nurses/caregivers about dependent and non-dependent elderly residents in retirement homes. Stancic et al [15] and Goh et al [1] reported the positive attitude of the participants towards the oral health of the elderly living in retirement homes, which were consistent with the results of the present study. In 2008, Sumi et al [16] conducted a study on the caregivers in Japanese retirement homes and found that almost all of them were aware of the importance of oral health. This finding has been reported in nearly all of the relevant studies.

According to the results of the present study, nurses/caregivers working had a good practice with a mean score of 9.46 (total score: 10.0). The majority of the nurses/caregivers assisted the elderly in cleaning their teeth/dentures to maintain and improve their oral health, about half of the caregivers brushed the elderly's teeth/dentures at least once a day. These findings indicated that the nurses/caregivers had basic training; however, some details, like the use of toothpaste for cleaning dentures, need to be modified. In a study by Stancic et al in 2016 [15], oral and dental health practices performed by nurses/caregivers mostly included denture cleaning and tooth brushing. In 2021, Chebib et al [17] evaluated the knowledge, attitude, and prac-



tice of healthcare providers regarding the provision of oral health services to older people. The results showed that the frequency of brushing was 97% and 89% in non-dependent and dependent older people, respectively. The frequency of cleaning dentures was lower in this study compared to our research. According to the results of the present study, the main barriers to oral health maintenance of the elderly according to nurses/caregivers were elderly people's lack of cooperation and time constraints. It seems that the elderly people, due to their age and possible oversensitivity, may not be very cooperative with oral health care practices, which was cited as one of the barriers to oral health maintenance by half of the nurses/caregivers in the present study.

In 2012, Willumsen et al [18] cited lack of cooperation of retirement home residents as the main barrier to oral health improvement of the older people, which is in line with our results. Similarly, some other studies mentioned lack of time as the main barrier, which is rather consistent with the findings of the present study too [15,19-21]. Lack of time was the second most frequent barrier to oral health improvement in older people in the present study, which underlines the importance of allocating more time for oral hygiene. According to the results of the present study, age and education received as a caregiver had significant effects on predicting the knowledge scores of the nurses/caregivers regarding geriatric oral health. In addition, education received as a caregiver and frequency of dental visits had significant effects on predicting the attitude score, and age, number of working hours per week, education received as a caregiver, and frequency of dental visits had significant effects on predicting the practice score. All of these variables had direct effects (except for the effect of number of working hours per week on the practice score). In other words, the practice score reduced with an increase in working hours per week. Other variables had no significant effects on knowledge, attitude, and practice scores.

These findings indicate the significant effects of education received as a caregiver on predicting their scores of knowledge, attitude, and practice about the oral health of the older people and emphasize the role of education in this regard. These educations serve as a basis for their knowledge, attitude and practice. The number of working hours per week had an inverse effect on predicting the practice score; a finding that seems to be related to the negative effects of long working hours per week since with an increase in the working hours, the nurses have no time for performing

their job duties properly. Although the participants of the presents study had an adequate level of knowledge, they need improvements in some details. To overcome this problem, it is suggested that nurses/caregivers participate in continuing education programs designed for geriatric oral health to review and update the educational content in order to provide oral health services for elderly patients.

## Conclusion

The findings of the present study indicated the significant effects of education received as a caregiver on predicting their knowledge, attitude, and practice about the oral health of the older people. The number of working hours per week had an inverse effect on their practice and time scarcity was found as a major barrier for oral health practice. Due to the importance of oral health on the general health of the elderly, planning is needed to provide continuing education for nurses and remove the barriers to oral health care and maintenance in older people.

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## Conflict of Interest

There is no conflict of interest to declare.

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