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Relationship Between Dental Insurance and Dental Treatment Acceptance in Older Adult Patients in Mashhad Regions

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Abstract: The effect of dental insurance on the ranking of dental needs in older adults has not been reported previously. We examined this effect using data obtained from a cross-sectional survey of older adults living in homes for the aged in Mashhad Region, Khorasan. History of dental insurance was obtained during interviews. Dental needs, assessed during clinical examinations, were ranked from no need to urgent need according to the guideline of the Iranian Dental Association. The associations between the rank of dental needs, dental insurance and other factors were analyzed with the Kruskal-Wallis test, χ^2 test, analysis of variance and multiple logistic regressions. Of the 252 participants, 80 (31.7%) had been insured continuously since 2006, 69 (27.4%) had no need for dental treatment and 59 (23.4%) needed urgent dental care. More of the continuously insured than the uninsured residents were dentate (46/80 [57.5%] vs. 75/172 [43.6%], $p = 0.04$). Ranking of the need for care was not significantly influenced by dental insurance; need of any kind was explained by being dentate (odds ratio 12.3, 95% 15-confidence interval 5.6-27.3).

Key words: Dental insurance, older adult, dental treatment, dental needs, uninsured residents

INTRODUCTION

The effect of dental insurance on the oral health status of people 80 years of age 19 and older is unknown. The RAND Health Insurance Experiment provided evidence that reducing the level of coinsurance paid by families increased the probability of any use of dental services, the mean number of visits per person and the mean expenditure per person 64 years of age or Younger (McKusick *et al.*, 2002). Insured patients received better care than uninsured patients: they had higher odds of receiving preventive care, crown and bridge treatment and endodontic treatment and lower odds of having dental extraction (Barenthin, 1976). Hart and Fields (Murdock *et al.*, 2005) have shown that a patient's acceptance of the best treatment plan was directly related to the availability of financial subsidy to pay for the treatment. On the basis of clinical outcome measures of oral health, the RAND study also showed that reducing coinsurance improved oral health status among those younger than 35 years of age (Bailit *et al.*, 1985). Survey findings on the effect of dental insurance on utilization of dental services by elderly people is inconsistent. Reviews of dental plans in Ferdosi University showed that dental insurance improved the

use of dental services, especially among edentulous patients. Yet other researchers have reported that dental insurance was not an important contributor to the use of dental services by the elderly when the analysis was controlled for dental status. Later trend analysis in Sweden pointed to an improvement in oral health status, measured as the proportion of those with teeth having few or no fillings. The prevalence of edentulism also declined between 2002 and 2009, especially among those 50 years of age or older. The effects of dental insurance on oral health status assessed by means of patient based measures have also been equivocal (Locker, 1992; Lin and Schwarz, 2001). Nonetheless, there is a consensus that there is a high level of unmet needs among the elderly, especially those living in institutions (Henriksen, 2003; Locker *et al.*, 1991). These needs are higher among people who have used dental services irregularly (Dolan *et al.*, 2005) and those who have not visited the dentist within the previous year (Otcere, 2002).

The Iranian Dental Association scheduling guideline for the elderly population is based on the following priorities of care (from highest to lowest): relief of pain, elimination of pathosis, elimination of irritating conditions, management of bone and soft-tissue conditions, repair of teeth and restoration of function. This guideline is

consistent with clinical decision principles, where emergency care and scheduling of continuing care is based on the extent to which a clinical condition is serious or life threatening. Dental insurance minimizes financial barriers to dental care by reducing direct patient costs. Therefore, insured patients would be expected to accept best care recommendations, which should result in fewer needs or needs of lower priority relative to uninsured patients.

We don't find any studies comparing dental needs of insured and uninsured elderly people. In Mashhad Region, a large industry introduced dental insurance in 2000 and this insurance continues as a benefit after retirement. We anticipated that a substantial proportion of elderly people living in institutions in Mashhad Region would have this coverage. The aim of this study was to examine the effects of dental insurance and other factors on the rank of dental 63-needs among older adults.

MATERIALS AND METHODS

Residents of Mashhad Region's homes for the aged served as the study population.

Permission for a structured face-to-face interview with residents or, for cognitively impaired residents; a telephone interview with health care substitute decision-makers was sought from all 788 residents of these institutions or their substitutes. Trained staff of Mashhad Region's Dental Division carried out the interviews and requested consent to perform a clinical examination. All clinical examinations were carried out within one month of the interview by a single trained examiner. A high level of agreement was achieved between the examiner and the training dentist.

Outcome variable: Dental needs were based on information obtained during the clinical examination, which followed methods set out by the World Health Organization, in which treatment required for each observed condition is recorded at the time of examination. A need for dentures was recorded only when the participant agreed with the identified clinical need. We used an algorithm that determined the highest level of need for each participant, to rank participants needs. Absence of need for dental treatment was ranked as 0 and the highest-ranking as 5 need was for soft-tissue surgery or urgent dental treatment (because of pain or lesions likely to cause pain within one month) or a history of dental pain within the 2 weeks preceding the interview.

Independent factor-dental insurance: The residents history of dental insurance was obtained during the

interview. Three categories were identified never insured, previously insured but coverage lapsed upon retirement and continuously insured since the 2002.

Other independent factors: The effects of a variety of other factors age, sex, marital status education, occupation, activities of daily living, cognitive status, perceived need for dental care, oral health beliefs, time since last dental visit and dental status were also examined. There are no standard measures of an individual's beliefs about oral health, so we developed a composite index. Residents who agreed with all 3 of the following statements older adults can influence their own health, visiting the dentist will prevent an older adult from having dental problems and dental health is high on the list of priorities were given a score of 2; those who disagreed with all statements were given a score of 0. All other responses were 100-scored 1.

Statistical analysis: The Kruskal-Wallis test was used to assess the influence of dental insurance and other independent factors on the ranking of needs. The Kendall coefficient of concordance was used to assess the degree of correlation between the ranking of dental needs and each independent factor. Bivariate association between dental insurance and other potential independent factors was examined with the test or Analysis of Variance (ANOVA). Before the assessment of confounding, the ranking of needs was collapsed into 2 categories (needing no care = 0, needing any care = 1) so that the effect of other factors could be analyzed with logistic regression analysis.

Factors were then identified to explain the need for dental care among participants. All data were analyzed with SAS version 8.

RESULTS AND DISCUSSION

Out of the 788 residents, 504 were interviewed and 275 participated in both an interview and a clinical examination. However, we excluded from the analysis all participants who were either younger than 65 years of age or whose dental insurance coverage had lapsed upon retirement. Therefore, 54 and 23 participants were excluded from the 2 groups, respectively. Those who participated in the clinical examination were significantly more likely to have retired from a skilled occupation, to perceive a need for care, to report being dentate and to be able to carry out all activities of daily living; there was also a trend in this group toward being younger than 80 years (Table 1).

Table 1: Characteristics of 450 elderly residents of Mashhad's homes for the aged in relation to participation in clinical exam

Characteristic	Residents who participated in clinical exam	Residents who did not participate in clinical exam	All residents	p-value (χ^2 test)
Age (No. and % ≥ 80 years old)	160/252 (63.5)	142/198 (71.7)	302/450 (67.1)	0.06
Sex (No. and % female)	195/252 (77.4)	160/198 (80.8)	355/450 (78.9)	0.38
Marital status (No. and % married)	66/214 (30.8)	NA	NA	NA
Educational status (No. and % with at least a high school education)	33/214 (15.4)	NA	NA	NA
Occupational status (No. and % who retired from an unskilled occupation)	92/252 (36.5)	117/198 (59.1)	209/450 (46.5)	< 0.0001
Oral health beliefs (No. and %)				
Agreed with all statements	55/215 (25.6)	31/51 (20.5)	86/366 (23.5)	0.54
Agreed with 1 or 2 statements	140/215 (65.1)	106/151 (70.2)	246/366 (67.2)	
Disagreed with all statements	20/215 (9.3)	14/151 (70.2)	34/366 (9.3)	
Time since last dental visit (No. and %)				
< 1 year ago	78/227 (34.4)	57/176 (29.6)	130/403 (32.3)	0.55
1-2 years ago	52/227 (22.9)	47/176 (26.1)	98/403 (24.3)	
> 2 years ago	97/227 (42.7)	78/176 (44.4)	175/403 (43.4)	
No. (and %) with perceived need for care	72/250 (28.8)	35/193 (18.1)	107/443 (24.2)	0.009
Dental status (No. and %) Dentate	121/252 (48.0)	NA	NA	NA
Reported being dentate in interview	119/251 (47.4)	69/194 (33.5)	184/445 (41.3)	0.003
Dental insurance status (No. and % continuously insured)	80/252 (31.7)	48/198 (24.2)	128/450 (28.4)	0.08

NA: Not available

Dental insurance coverage: Among the 275 participants who had participated in both an interview and a clinical examination, 173 participants (62.9%) had never had any dental insurance coverage, 17 (6.2%) had dental coverage that paid for some or all of their dental treatment during their working years and the remaining 85 (30.9%) had dental insurance that continued into their retirement years. Eighty (31.7%) of the 252 residents for whom we analyzed interview and examination data had been continuously insured. The mean age of the 252 participants was 83.5 years (SD 7.8 years) and there was no 30-significant difference in age between the continuously insured and never insured groups. Those with continuous dental insurance were significantly more likely than those who had never had insurance to be male, to be married, to agree with all 3 statements about dental beliefs, to have visited the dentist more recently, to be dentate, to have more teeth remaining in the mouth and to be able to carry out all activities of daily living (Table 2). Although, being continuously insured was associated with being dentate and with the number of teeth remaining in the mouth, there was no association between insurance status and number of teeth remaining among dentate participants.

Ranking participants' need for dental care: Urgent treatment was needed by 59 (23.4%) of the participants and 69 (27.4%) needed no treatment. The ranking of participants' need was not related to dental insurance status (Kruskal-Wallis $\chi^2 = 0.34$, $p = 0.56$). However, insured participants' need for 143-new dentures was twice that of uninsured participants. Participants with higher needs were significantly more likely to perceive a need for dental care, to be dentate and to be cognitively competent

(Table 3). There was a moderate, statistically strong association between being dentate and having needs of higher ranking (Kendall's tau $b = 0.41$, $p < 0.001$) (data not shown). There were trends toward needs of higher rank among female participants and those who were able to perform all activities of daily living. We observed potential for the relationship between dental insurance and the ranking of residents' needs to be confounded by sex, dental status and ability to perform all activities of daily living (Table 3). However, logistic regression showed that none of these 3 factors nor any one-way interaction terms confounded the effect of dental insurance on dental needs. Thus, the only factor significantly related to needs of any kind was being dentate. Participants who were dentate were more than 12 times more likely to need dental care (odds ratio 12.3, 95% confidence interval 5.6-27.3). The sensitivity of the model was 100% when 158-applied to the population of older adults in Mashhad's homes for the aged. However, according to this model 27.4% of residents would be falsely classified as needing dental care.

We examined the relationship between dental insurance status and rank of dental needs among residents in Mashhad Region's homes for the aged. Nearly 3 of every 4 participants (72.6%) had a need for dental care and nearly 164-one-quarter (23.4%) had the highest-ranked need. Almost one third (31.8%) of participants who underwent the clinical examination had been insured continuously since, 2000. However, being dentate was the only factor that explained having any need for dental care. Both bivariate and stratified analysis indicated that the rank of dental needs was not related to dental insurance status (Lin and Schwarz, 2001). Those who participated in both the interview and the clinical

Table 2: Characteristics of 252 elderly residents of Mashhad's homes who participated in an interview and a clinical examination in relation to continuous dental insurance

Characteristic	Residents who participated in clinical exam	Residents who did not participate in clinical exam	All residents	p-value(χ^2 test)
Age (No. and % ≥ 80 years old)	49/80 (61.2)	111/172 (64.5)	160/252 (63.5)	0.61b
Sex (No. and % female)	54/80 (67.5)	141/172 (82.0)	195/252 (77.4)	0.01b
Marital status (No. and % married)	31/73 (42.5)	36/150 (24.0)	67/223 (30.0)	0.005b
Educational status (no. and % with at least a high school education)	12/72 (16.7)20/	20/140 (14.3)	32/212 (15.1)	0.65b
Occupational status (no. and % who retired from an unskilled occupation)	56/80 (70.0)	104/172 (60.5)	160/252 (63.5)	0.14b
Oral health beliefs (no. and %)				
Agreed with all statements	29/72 (40.3)	26/143 (18.2)	55/215 (25.6)	0.002b
Agreed with 1 or 2 statements	38/72 (52.8)	102/143 (71.3)	140/215 (65.1)	
Disagreed with all statements	5/72 (6.9)	15/143 (10.5)2	20/215(9.3)	
Time since last dental visit (no. and %)				
<1 year ago	34/72 (47.2)44/	44/155 (28.4)	78/227 (34.4)	0.004b
1-2 years ago	18/72 (25.0)34/	34/155 (21.9)	52/227 (22.9)	
>2 years ago	20/72 (27.8)77/	77/155 (49.7)	97/227 (42.7)	
No. (and %) with perceived need for care	24/80 (30.0)	48/170 (28.2)	72/250 (28.8)	0.77b
Dental status				
No. (and %) dentate	46/80 (57.5)	75/172 (43.6)	121/252 (48.0)	0.04b
Mean no. of teeth present (and SD) 8.3	8.3(9.2)	5.5 (8.0)	6.4 (8.4)	0.01c
Mean no. of teeth present among dentate subjects (and SD) ^d	14.5 (7.6)12.4	12.4(7.8)	13.2 (7.7)	0.15c
Cognitive status (no. and % cognitively competent)	39/80 (48.8)	88/172 (51.2)	127/252 (50.4)	0.72b
No. and % able to perform all activities of daily living ^e	15/77 (19.5)	15/169 (8.9)	30/246 (12.2)	0.02b

a: Participants whose dental insurance coverage had lapsed upon retirement and those who were younger than 65 years of age were excluded from analysis b: χ^2 test, c: Analysis of variance (ANOVA), d: Dentate subjects consisted of 46 participants who were continuously insured and 75 who were uninsured e: Able to take care of oneself in the toilet;eat,dress, undress and select clothing from wardrobe, bathe and walk about the home without assistance

Table 3: Rank of dental needs related to independent factors^a

Independent factor	Rank of dental need; % of participants						n	p-value ^b
	0	1	2	3	4	5		
Age								
>80 years	31.2	28.8	10.6	5.6	1.2	22.5	160	0.25
65-79 years	20.6	37.0	10.9	5.4	1.1	25.0	92	
Sex								
Male	35.1	33.3	8.8	7.0	0.0	15.8	57	0.06
Female	25.1	31.3	11.3	5.1	1.5	25.6	195	
Marital status								
Married	26.9	28.4	17.9	6.0	3.0	17.9	67	0.86
Unmarried	27.6	35.3	7.0	5.1	0.6	24.4	156	
Educational status								
At least high school	28.1	31.2	12.5	6.2	0.0	21.9	32	0.96
Less than high school	28.3	31.1	10.6	5.6	1.7	22.8	180	
Occupation before retirement								
Skilled and higher occupation	28.3	25.0	13.0	6.5	1.1	26.1	92	0.47
Unskilled or not in labour market	26.9	35.6	9.4	5.0	1.2	21.9	160	
Oral health beliefs								
Agreed with all statements	25.4	30.9	7.3	9.1	1.8	25.4	55	0.32
Agreed with 1 or 2 statements	29.3	31.4	9.3	5.7	1.4	22.9	140	
Disagreed with all statements	15.0	30.0	20.0	0.0	0.0	35.0	20	
Time since last dental visit								
<1 year ago	16.7	39.7	9.0	7.7	0.0	26.9	78	0.13
1-2 years ago	28.2	31.8	9.4	8.2	1.2	21.2	52	
>2 years ago	37.5	26.6	10.9	1.6	1.6	21.9	97	
Perceived need for care								
Yes	13.9	23.6	13.9	4.2	1.4	43.1	72	<0.001
No	32.6	35.4	9.6	6.2	1.1	15.2	178	
Dental status								
Dentate	6.6	34.7	9.9	11.6	2.5	34.7	121	<0.001
Edentulous	46.6	29.0	11.4	0.0	0.0	13.0	131	

Table 3: Continued

Independent factor	Rank of dental need; % of participants						n	p-value ^c
	0	1	2	3	4	5		
Cognitively competent								
Yes	23.6	29.9	11.0	6.3	0.8	28.4	127	<0.05
No	31.2	33.6	10.4	4.8	1.6	18.4	125	
Activities of daily living								
Performs all ^a	13.3	33.3	13.3	13.3	3.3	23.3	30	0.09
Does not perform all	30.1	31.5	10.6	3.7	1.0	23.2	216	
Overall	27.4	31.7	10.7	5.6	1.2	3.4	252	

a: Participants whose dental insurance coverage had lapsed upon retirement were excluded from analysis, b: Kruskal-Wallis χ^2 test, c: Able to take care of oneself in the toilet; eat; dress, undress and select clothing from wardrobe; bathe; and walk about the home without assistance

examination differed from those who participated in the interview only. They were more likely to be dentate, to be retired from a skilled occupation, to perceive a need for dental care and to be able to perform all activities of daily living. These factors were also highly correlated with the ranking of participants' dental needs (Silva *et al.*, 2004). Continuously insured participants and those with needs of higher ranking were more likely to be dentate and to be able to perform all activities of daily living. Therefore, the uninsured participants who had a clinical examination may have been better off than uninsured residents who did not participate. This selection bias would probably decrease the difference between insured and uninsured participants and thus diminish any effect of dental insurance on the outcomes. The 2-fold greater need for dentures among insured than among uninsured participants might have been caused by those with insurance more readily admitting to a need that their insurance would cover.

Thus insured participants would tend to have a higher needs score. Because the potential biases in this study operate in the same direction, the combination would tend to produce a lack of association between the rank of dental needs and dental insurance status. Cost of treatment, although important (Kiyak and Reichmuth, 2005; Kandelman and Lepage, 2007), is not the only barrier to the receipt of timely and appropriate care. Other serious barriers for nursing home residents arise because dental insurance does not cover indirect costs. Half of percent study participants were cognitively incompetent and only 87.8% (216/246) was able to carry out all 5 activities of 192-daily living. Out of pocket costs could well limit a resident's access to care if a relative has to take time off work to take the resident to the dentist.

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