**ORIGINAL ARTICLE** 

# Risk-based Approach in Preventive Practice among Iranian Dentists

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Purpose: To study risk-based preventive practice among Iranian dentists.

**Materials and Methods:** A questionnaire survey was conducted at two annual dental meetings in 2004 and 2005 in Tehran. Using a five-point Likert scale, respondents indicated their level of agreement with taking preventive measures including oral hygiene, use of fluoride, diet and dental check-up for a high- and a low-risk (HR and LR, respectively) hypothetical patient case. Respondent's smoking and activity in smoking cessation were enquired about as well. Of 1033 responding dentists, 980 (64% men) were eligible for this study. Statistical evaluation was by the chi-square test and logistic regression.

**Results:** The top four of the eight measures were instructions on tooth brushing and flossing, advice related to fluoridated toothpaste, and regular dental check-ups, with the choice 'fully agree' being more prevalent for the HR (74%-58%) than for the LR case (59%-41%). For the HR case, 45% of the respondents fully agreed with applying chair-side tooth cleaning, 41% with advice on diet modification, and 38% with advice on home-use of sodium fluoride mouthwash. Of all respondents, 76% were nonsmokers and 56% reported that they always recommend their smoking patients to quit. Female gender and activity in professional reading were associated with higher levels of agreement for applying preventive measures to the HR case. Non-smoking was the strongest explanatory factor (OR = 3.6, 95% Cl = 2.6-5.1) of dentist's higher involvement in smoking cessation.

**Conclusion:** Risk-based preventive dental care should be emphasised and applied in order to maximise efficient use of resources.

Key words: dentist's characteristics, preventive treatment, risk-based practice, smoking cessation

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Despite the recent improvements in the oral health of the general public, dental caries and periodontal diseases still are major concerns worldwide, especially among underprivileged groups (Petersen, 2003a). Smoking, the most significant public health problem, is also a proven cause of oral disorders (Petersen, 2003b; Reibel, 2005). With regard to the preventable nature of these major oral diseases and their risk factors, which are common with some other chronic diseases (Sheiham and Watt, 2000; Petersen, 2003a), the importance of preventive measures has been strongly emphasised (Task Force on Community Preventive Services, 2002; Petersen and Lennon, 2004) and their efficacy has also been widely studied (Anusavice, 1997; Bader et al, 2001; Warnakulasuriya, 2002; Kressin et al, 2003; Oscarson et al, 2003; Ekstrand and Christiansen, 2005).

Hitherto, dentists seem to have underestimated preventive measures and the risk-based approach in their practice (Brennan et al, 1998; Kawamura et al, 1998; Helminen et al, 1999; Varsio et al, 1999). Dentists are increasingly being expected to apply preventive measures in their routine practice (Pitts, 2004) regarding the influences of their practice on oral health (Petersson and Bratthall, 1996) and overall health (Dyer and Robinson, 2006).

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Due to their frequent contacts with the general public, dentists' involvement in smoking cessation has been considered a necessary preventive measure (Petersen, 2003b). Dentists, accordingly, seem to recognise the importance of smoking cessation and are becoming more active in this area of preventive practice (Johnson et al, 2006).

The present study investigated risk-based approaches in the preventive practice of Iranian dentists and their involvement in smoking cessation, in relation to their practice, activity in continuing education and smoking habits.

# **MATERIALS AND METHODS**

General dental practitioners (GDPs) in Iran were the target population for the present study. Data were obtained with a self-administered questionnaire that was pre-tested on a group of ten dentists and revised accordingly. The target subjects comprised participants of two major dental meetings, mainly designed for GDPs, in Tehran, Iran. One meeting was in December 2004, and the other in July 2005, which provided a convenience sample of about 1000 GDPs. Dentists from all parts of the country participated in such meetings in order to receive credits for renewal of their licence to practice dentistry, to refresh their knowledge of various aspects of dentistry and to visit comprehensive dental exhibitions. During the meetings, the dentists received the questionnaire in their meeting documents, filled it in and returned it anonymously. Those who filled in the questionnaire at the first meeting were not asked to do it again. A raffle ticket for a lottery on dental materials was the only remuneration for participation. The questionnaire covered various aspects of dentists' preventive practice and their activities in continuing education and smoking cessation. Dentists' year of birth, gender, smoking habits, and practice-related factors served as background information.

#### Subjects

A total of 1033 dentists returned the questionnaire. Those who provided no information about their gender or age (n = 20), those under 24 years of age (n = 11) or older than 67 years of age (n = 5), and those who were not practising as a dentist (n = 17), were excluded, leaving a total of 980 respondents for the basic data. Their mean age was 37.3 years (SD = 7.7) and 64% were men.

#### **Patient cases**

Two hypothetical patient cases, each with a different caries situation, served for the assessment of dentists' preventive practices.

Case A, an 18-year-old son of a factory worker, with no systemic or mental diseases. His tooth brushing was irregular, and he had visible plaque on all teeth; four of his teeth (25, 26, 35, 46) had fillings, and three teeth (16, 15, 34) had current radiographically proven dentinal caries. He complained of transient pain in tooth 34 when drinking cold water.

Case B, a 22-year-old female medical student with no sytemic or medical problems. She brushed her teeth on a regular basis and had only one filling (tooth 36) placed 5 years ago. She had current radiographically proven dentinal caries (tooth 35) with no other signs of caries after radiographs and a clinical examination, She complained of 'having a decayed tooth' (tooth 35).

### Measures of preventive practice

The selection of eight preventive measures (see Table 1) and their implementation followed the suggestions in a recent textbook (Kidd and Nyvad, 2003) and the recommendations of the Journal of the American Dental Association (1995). The participants indicated their level of agreement regarding the implementation of each of the eight measures of preventive care separately for Case A and Case B. For each measure, the respondent marked one option from a 5-point Likert scale ranging from 'Fully agree' to 'Fully disagree'. The analyses were based only on data provided by those respondents who answered all eight measures: for Case A (n = 838) and Case B (n = 821). For further analyses, the answers were scored from 0 to 4, with the larger corresponding to greater involvement in preventive care. The sum of scores for the eight measures for Case A and Case B represented dentists' input toward preventive care in each case. Respondent's preventive input was categorised into one of the following three categories: Low ( $\leq$  21), Medium (22–28), and High (29-32) preventive input, separately for Case A and Case B, based on the distribution of the corresponding total scores. Preventive input was further dichotomised as High or not for Case A, and as Low or not for Case B.

#### **Risk-based preventive approach**

In the analyses, Case A was taken as a high-risk (HR) patient, and Case B as a low-risk (LR) patient. Recom-

mendations for good clinical practice (Journal of the American Dental Association, 1995; Kidd and Nyvad, 2003; Anusavice, 2005) suggest that all of the eight preventive measures should be applied to the HR patient. For the LR case, only three (instruction on tooth brushing, advice related to using fluoridated toothpaste and regular dental check-up) are necessary for adequate care. On this basis, the dentists in the present study were expected to be in the category of highpreventive input for the HR case and in the category of low-preventive input for the LR case.

# Dentists' smoking status and activity in smoking cessation

Information on dentists' smoking habits was obtained from responses to three similar questions, which were asked separately for cigarettes, pipe, and water-pipe as follows: 'Do you smoke cigarettes/a pipe/a waterpipe?' Each could be answered with the following alternatives:

- No, I do not smoke.
- No, I used to smoke, but I have quit.
- Yes, once a month or less.
- Yes, a few times (2–3) a month.
- Yes, a few times (2–3) a week.
- · Yes, daily.

For the analyses, respondents with any Yes answer were considered to be smokers.

Dentists' involvement in smoking cessation was determined in response to the question: 'How often do you advise a smoking patient to quit that habit?' The following alternatives were offered as an answer: Always, Occasionally, Seldom, and Never.

# **Practice-related factors**

Practice-related factors covered practice location (capital or elsewhere), years of experience (years since graduation) and practice type, in which the answers to the question: "What is your current job?" were categorised as:

- Private (self-employed, employed in private office or working in charity clinics)
- Public (employed by the government, engaged in mandatory practice stage in public clinic or working as a teacher at a dental school)
- Both sectors (practising in both private and public clinics)
- · No present clinical work.



Two questions elicited information about the respondent's involvement in continuing education: 1) 'When did you last attend a continuing education course on caries prevention?' with these alternatives: Within the past year, 2–5 years ago, More than 5 years ago, Never, and I don't know; 2) 'Which of the following dental journals do you usually read?' with six alternatives later categorised as: No reading, Selective reading (restricted to practical national dental journals only), Moderate reading (including also scientific national dental and medical journals) and Extensive reading (reading international scientific dental journals moreover).

#### Statistical evaluation

Statistical evaluations were done using the chi-square test for differences in frequencies. To evaluate the strength of the factors related to dentists' preventive input, separately for the HR and LR cases, and activity in smoking cessation, three similar logistic regression models were fitted to the data. The terms of the models facilitated the calculation of the corresponding odds ratios (OR) and their 95% confidence intervals (95% CI). The ORs were estimated for dentists' belonging to the category of high preventive input for the HR case and to the category of low preventive input for the LR case. The outcome for involvement in smoking cessation was dichotomised and the ORs were estimated for dentists' belonging to the category of 'Always recommending smoking patients to quit smoking'. The goodness of fit of the models was evaluated with the Hosmer-Lemeshow test.

# RESULTS

For the HR case, the majority of respondents agreed with providing instruction on tooth brushing and flossing, and on regular dental check-ups, with the option 'Fully agree' being more prevalent (Table 1). Providing advice on the use of fluoridated toothpaste was agreed by 90% of the dentists, and advice on diet modification and chair-side tooth cleaning by 80%. A total of 70% of the respondents agreed with advising the home-use of sodium fluoride mouthwash and 53% with chair-side application of fluoride gel twice-yearly.

For the LR case, 93–79% of the respondents' agreed with applying the same top four measures as in the HR case, but at lower rates (Table 1). For each of these measures, the option 'Fully agree' was selected by fewer dentists. Half of the dentists reported their

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Table 1 Distribution (%) of Iranian dentists' level of agreement with applying preventive measures, separately for the high-risk (HR) case (n = 838) and the low-risk (LR) case (n = 821)

	Case <sup>1</sup>	Fully agree	Agree	No idea	Disagree	Fully disagree
Instruction on tooth	HR +	74	22	2	1	1
brushing	LR +	45	34	12	6	3
Instruction on flossing	HR +	73	23	2	1	1
	LR	59	34	4	2	1
Regular dental check-up <sup>2</sup>	HR +	69	28	2	<1	<1
	LR +	59	34	4	2	1
Advice on the use of	HR +	58	32	6	3	1
fluoridated toothpaste	LR +	42	37	13	6	2
Chair-side tooth cleaning	HR +	45	36	12	5	2
C C	LR	26	29	20	18	7
Advice on diet modification	HR +	41	38	15	4	2
	LR	23	25	29	17	6
		20	20	10	7	
Advice on weekly nome	HR +	38	32	19	1	4
use of 0.2% sodium fluoride mouthwash	LR	25	23	29	16	1
Chair-side application of	HR +	24	29	26	15	6
fluoride gel twice yearly	LR	17	17	26	28	12
<sup>1</sup> The measure is suggested (+) at that level	of risk (Kidd and	Nwad 2003)				

<sup>2</sup> The measure is suggested (+) for HR at 3 to 6 months interval, for LR at 9 to 12 months interval.

agreement with implementing chair-side tooth cleaning, advice on diet modification and the home-use of sodium fluoride mouthwash, and 34% agreed with the chair-side application of fluoride gel twice-yearly.

Regarding the HR case, 32% of the respondents fell into the category of high preventive care input, 52% into the medium category and 16% presented low input; for the LR case, the figures were 17%, 39%, and 44%, respectively (Table 2). For the HR case, no significant differences in the preventive care input appeared based on respondent's characteristics. For the LR case, the only significant difference observed was based on the type of practice: half of the dentists working solely in the private sector fell in the category of low preventive care input.

Distributions of respondents' input toward preventive care based on their activities in continuing education are shown in Table 3. The more professional literature they read, the more likely they were to report higher input toward preventive care in the HR case (p < 0.001). For the LR case, no such difference was observed.

The vast majority of dentists (76%) were non-smokers; 87% of the women were non-smokers versus 70% the men (p < 0.001) and older men more often than younger men (76% versus 62%, p = 0.03). Of all respondents, 56% reported that they always recommend a smoking patient to quit the habit, 32% reported they did this occasionally, 9% seldom, and 3% reported no activity. A response of 'Always recommending to quit smoking' was more likely from female than from male dentists (61% versus 53%; p = 0 .01), from the older than the younger dentists (68% versus 54%; p = 0.006), and from non-smoking rather than from smoking dentists (63% versus 32%; p < 0.001).

Table 4 shows the results of three logistic regression models explaining factors related to dentist's riskbased approach to preventive dental care. For the HR case, the model was to estimate dentist's belonging to the category of high preventive care input. That ap-

				High-risk case					Low-risk case		
			Low	Medium	High			Low	Medium	High	
		n	%	%	%	p-value	n	%	%	%	p-value
All		838	16	52	32		821	44	39	17	
Gender	Men	532	16	54	30	0.18	521	42	40	18	0.39
	Women	306	16	48	36		300	47	38	15	
Age in	< 35	320	17	49	34	0.80	316	45	37	18	0.72
years	35-44	417	16	53	31		412	43	42	15	
	≥45	101	14	55	31		93	45	37	18	
Practice	Capital	385	14	54	32	0.37	379	43	42	15	0.24
location	Elsewhere	453	17	50	33		442	45	37	18	
Practice	Private	584	16	52	32	0.40	572	48	36	16	0.007
type	Public	58	9	62	29		56	34	45	21	
	Both	196	17	49	34		193	34	46	20	
Years in	1-8	482	19	50	31	0.21	473	43	38	19	0.61
practice	9-16	264	13	53	34		261	44	41	15	
	≥ 17	92	12	58	30		87	46	40	14	

Table 2 Distribution (%) of Iranian dentists on the basis of the level of their input toward preventive care in the highrisk (n = 838) and the low-risk (n = 821) case, according to dentists' background and practice-related factors

peared to be more likely for female dentists (OR = 1.4, 95% CI = 1.0-1.9) and for those reading professional journals (OR = 1.2, 95% CI = 1.0-1.4). For the LR case, the model was for dentist's belonging to the category of low preventive care input; for that, the only statistically significant factor was employed in private practice.

The third model estimated dentist's high involvement in smoking cessation. Non-smoking (OR = 3.6, 95% Cl = 2.6-5.1) and female gender (OR = 1.4, 95%Cl = 1.0-1.9) were the strongest factors to explain a dentist's reporting that he/she always recommended smoking patients to quit smoking.

#### DISCUSSION

The majority of the dentists agreed with applying wellknown preventive measures such as instructions on tooth brushing, flossing, using fluoridated toothpaste and regular dental check-ups in the HR case. For the LR case, the dentists agreed with applying well-known preventive measures at almost similar rates. Regarding recommendations for the preventive treatment of high-risk cases (Kidd and Nyvad, 2003), the respondents would have tended to under-treat the HR case, but over-treat the LR case. This indicates an insufficient distinction between high- and low-risk patients' needs. For example, 79% of the dentists agreed with providing advice on diet modification in the HR case and 48% in the LR case. Although low-risk patients may not be expected to remain without any instructions on the effect of diet on caries, it has been proposed that a patient with such a low incidence of caries needs no diet modification (Kidd and Nyvad, 2003). Nevertheless, based on the concept of the common risk factor approach (Sheiham and Watt, 2000), all people, regardless of their risk for dental caries, will benefit from receiving basic preventive measures. In dental practice, however, risk-based approach is justified in enabling dentists to target their activities according to patients' need.

To target the proper type and amount of preventive treatment, risk-based prevention is recommended (Journal of the American Dental Association, 1995), and it has been verified as an effective caries management strategy in terms of good clinical and eco-

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Table 3 Distribution (%) of 1case, according to dentists'	Iranian dentis activity in co	sts on the ba	asis of the leve acation (CE)	l of their inp	ut toward pre	ventive care	in the high-	risk (n=838) ar	nd the low-r	isk (n=821)
			High-risk case					Low-risk case		
		Low	Medium	High			Low	Medium	High	
	Ę	%	%	%	p-value	۲	%	%	%	p-value
All	838	16	52	32		821	44	39	17	
Professional reading* None	59	48	38	14	<0.001	58	20	90 30	11	0.62
Selective Moderate	415 29	17 7	52 62	31 31		407 31	4 0 9 0	40 32	17 29	
Extensive	365	13	52	35		355	45	39	16	
Participation in CE courses Within last vear	422	16	ŐŐ	35	0.62	417	42	40	18	0.57
2-5 years ago	182	13	55	32		174	44	42	14	
>5 years ago	137	17	55	30		137	47	39	14	
* Selective reading: reading prac Extensive reading: in addition inc	ctical national c cludes internati	lental journals onal scientific	only. Moderate r dental journals.	eading: in add Statistical eva	lition includes so luation by chi-sc	cientific nationa	al dental and	medical journals		

nomical outcomes for children (Bader et al. 2003; Pienihäkkinen et al. 2005). Conversely, Hausen et al (2000) suggest basic prevention for all, based on their two-year clinical trial that found no pronounced tangible benefits from risk-based compared to populationbased prevention. That seems to be the line the Iranian dentists in the present study were following in their practices, since the majority of them agreed with the application of basic preventive measures even for a low-risk patient.

Despite the well-known effect of fluoride supplements for high-risk patients (Kidd and Nyvad, 2003), some 20-50% of the respondents, nevertheless seemed to underestimate the value of home-use of sodium fluoride mouthwash and of the chair-side application of fluoride gel for caries management. Neglecting the use of fluorides may be partly explained by the lower involvement of those dentists in updating their knowledge regarding preventive dental care. Consequently, the tendency to report any professional reading was associated with higher input toward preventive care in the HR case. The rate of agreement with the advice on the home use of sodium fluoride mouthwash was higher than that with the chair-side application of fluoride gel. This may indicate the respondents' preferences for encouraging patients to take more responsibility for their oral health rather than depending on dental services.

According to a group of experts, the use of fluoride toothpaste together with regular tooth brushing is one of the most important reasons for declines in caries incidence (Bratthall et al, 1996). The high rates of agreement of the Iranian dentists in the present study with the recommendation to provide instruction on tooth brushing and the use of fluoridated toothpaste indicates that they recognise the value of these two preventive measures. In addition, almost all the dentists agreed with the advice on flossing for both the HR and LR cases. This may be a sign of their concern about problems related to the presence of proximal caries and periodontal problems among their patients.

For the HR case, greater input in preventive care was more likely among female dentists and those with more extensive professional reading, which may indicate more positive attitudes among female dentists towards preventive dental care and greater benefits from reading professional literature. Although professional reading may give more information about preventive measures and their benefits, it seems to be ineffective in targeting preventive efforts, since in the LR case, no differences appeared in the dentists' reported preventive practice based on the extent of their professional reading. Working in a private practice appeared to be the

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Models and the factors included	ES	SE	OR	95% CI	p-value
High input in the high-risk case	20	01	011		praide
(n = 838)					
Gender ( $0 = Male$ , $1 = Female$ )	0.32	0.16	1.4	1.0-1.9	0.05
Practice sector ( $1 = Private, 2 = Public,$					
3 = Both sectors)	0.05	0.09	1.0	0.8-1.2	0.60
Participation in continuing education courses	-0.12	0.10	0.8	0.7-1.0	0.22
Extent of journal reading	0.18	0.07	1.2	1.0-1.4	0.02
Smoking (0 = Smoker, 1 = Non-smoker)	0.15	0.19	1.1	0.7-1.7	0.43
Constant term and goodness of fit* (p)	-1.16	0.32			0.56
Low input in the low-risk case $(n = 821)$					
Gender ( $0 = Male_1 = Female$ )	0.13	0.16	1 1	08-15	0.42
Practice sector $(1 = Private 2 = Public$	0.10	0.10	±.±	0.0 1.0	0.42
3 = Both sectors)	-0.31	0.09	0.7	06-08	0.001
Participation in continuing education courses	0.09	0.90	1.1	0.9-1.3	0.32
Extent of journal reading	-0.07	0.07	0.9	0.8-1.0	0.30
Smoking (0 = Smoker, 1 = Non-smoker)	0.32	0.18	1.4	0.9-1.9	0.08
Constant term and goodness of fit* (p)	-0.09	0.30			0.99
High activity in smoking cessation $(n = 980)$					
Gender ( $0 = Male, 1 = Female$ )	0.34	0.16	1.4	1.0-1.9	0.03
Practice sector $(1 = Private, 2 = Public.$	0.01	0120	2	210 210	0100
3 = Both sectors)	-0.05	0.08	0.9	0.8-1.1	0.59
Participation in continuing education courses	-0.32	0.09	0.7	0.6-0.8	0.001
Extent of journal reading	0.14	0.07	1.1	1.0-1.3	0.05
Smoking ( $0 = $ Smoker, $1 =$ Non-smoker)	1.30	0.17	3.6	2.6-5.1	< 0.001
Constant term and goodness of fit* (p)	-0.47	0.29			0.45

only important factor that was associated with the lower input toward dental prevention in the LR case.

Half of the dentists in the present study reported that they always advised smoking patients to quit smoking. This finding is comparable to the results of studies on dentists in the U.S. (Dolan et al, 1997) and Norway (Lund et al, 2004). The dentists' involvement in smoking cessation as part of their everyday dental practice might serve as a good example for oral health education.

In the present study, the finding that involvement in smoking cessation was higher among female than male dentists is in line with the results of a study on Norwegian dentists (Lund et al, 2004). The greater involvement of non-smokers compared to smokers is in line with the results of a study on Finnish dentists (Telivuo et al, 1991). These two reports and the present findings indicate that female and non-smoker dentists are more knowledgeable about the health hazards of smoking and, consequently, have positive attitudes towards supporting their patients to quit smoking.

The type of sampling might be a source of limitation since the subjects were participants in two dental meetings. Unfortunately, no reliable data on registered dentists in Iran are available and a mail survey thus was out of the question, leaving the present method as the most practical way to reach the dentists. The data on respondents' background, however, are in line with World Dental Federation (FDI) information about Iranian dentists (FDI, 2000), thus the present sample can be considered as reasonably well representative of Iranian dentists. Another limitation may be due to characteristics of questionnaire surveys, which may not necessarily reveal the real behaviour of the respondents. Thus, socially acceptable answering might appear among the respondents in the present study. The probability that those attending the meeting had a higher interest in the topics of the questionnaire may have caused the data to give an over-optimistic picture of the real situation.

#### CONCLUSION

To better meet each patient's need, more emphasis on a risk-based approach in preventive dental care is called for in dental school curricula and continuing education. In this process, comprehensive guidelines for preventive practice would be helpful.

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