Is Opportunistic Oral Cancer Screening by Dentists Feasible? An Analysis of the Patterns of Dental Attendance of a Nationally Representative Sample over 10 Years

Z.Y. Mohd Yusof[a]/G. Netuveli[b]/A.S. Ramli[c]/A. Sheiham[b]

Objectives: To assess whether or not opportunistic oral cancer screening by dentists to detect pre-malignant or early cancer lesions is feasible. The objective was to analyse the patterns of dental attendance of a national representative sample over a period of 10 years to ascertain whether individuals at high-risk of oral cancer would be accessible for opportunistic oral cancer screening.

Methods: Secondary analysis of data extracted from the British Household Panel Survey, a national longitudinal survey (n = 5547). Analysis to ascertain whether patterns of attendance for dental check-ups for a period of 10 years (1991–2001) were associated with risk factors for oral cancer such as age, sex, education, social class, smoking status and smoking intensity.

Results: Males, aged over 40 years, less educated manual workers and smokers were significantly less likely to attend for dental check-ups compared with females and younger, higher educated, higher socio-economic class non-smokers ($p < 0.05$). Throughout the 10-year period, young people, more than older people, had progressively lower odds ratios of attending. Those with more education used dental services more. Heavy smokers were infrequent attendees.

Conclusions: This study suggests that opportunistic oral cancer screening by dentists is not feasible to include high-risk groups as they are not regular attendees over 10 years. Those who would be screened would be the low-risk groups. However, dentists should continue screening all patients as oral precancers are also found in regular attendees. More should be done to encourage the high-risk groups to visit their dentists.

Key words: British men, dental attendance, opportunistic, oral cancer, screening

Oral Health Prev Dent 2006; 4: 165–171. *Submitted for publication: 05.10.05; accepted for publication: 01.03.06.*

Oral cancer has a high mortality rate and is a common form of cancer in countries such as India, Sri Lanka, Brazil, South Africa and among South Asian industrialised countries (Cancer Research Campaign, 1993). Survival rates for detected cases have remained unchanged for many years (Stell and McCormick, 1985). One of the strategies to improve survival rates is early detection of both pre-malignant and early cancer lesions, especially in high-risk groups, namely men in lower socio-economic groups aged over 40 years old who smoke and drink heavily and have an unhealthy diet (Blot et al, 1988; British Dental Association, 1998; British Dental Association, 2000; Cancer Research Campaign, 2000; Edwards and Jones, 1999; Faggiano et al, 1997; Harris et al, 1998; Hindle et al, 1996; Johnson and Warnakulasuriya, 1993; Llewelyn and Mitchell, 1994; Watt and Sheiham, 1999).

Recent recommendations by some dental organisations advise dentists to opportunistically screen high-risk individuals for early signs of oral cancer (British Dental Association, 2000; British Dental Health Foundation, 2003; Faculty of General Dental Practitioners, 2003; Federation Dentaire Internationale, 1999). A recent prospective study in Britain

[a] *Faculty of Dentistry, University of Malaya, 50603, Kuala Lumpur, Malaysia*

[b] *Department of Epidemiology and Public Health, 1-19 Torrington Place, University College London, London WC1E 6BT*

[c] *Primary Care Medicine Unit, Faculty of Medicine Universiti Teknologi MARA, 40450, Shah Alam, Selangor, Malaysia*

Reprint requests: *Dr ZY Mohd Yusof BDS (Belfast) MSc (London) DDPHRCS (UK), Department of General Dental Practice and Oral and Maxillofacial Imaging, Faculty of Dentistry, University of Malaya, 50603, Kuala Lumpur, Malaysia. Tel: 603-79674895/ 79674839. Fax: 603-79561607. Email: zamros@um.edu.my*

supported the idea that dentists could perform opportunistic screening for oral cancers (Lim et al, 2003). However, a randomised controlled trial on the effectiveness of screening for oral cancer reported no long-term differences in case fatality rates between the controls and the regularly screened group (Ramadas et al, 2003). In the absence of good evidence to support population screening (Chamberlain, 1993; Ramadas et al, 2003), the effectiveness of opportunistic screening as part of routine dental check-ups should be investigated. Although current evidence suggests that people at high risk of oral cancer have a much lower probability of attending for regular dental check-ups (Haughney et al, 1998), it was based on cross-sectional data and lacked information over a specific time period. As pre-cancer lesions may take years to become malignant (Gupta et al, 1995), opportunistic screening could still be considered effective if high-risk groups of oral cancer visited their dentists once in a few years, if not annually. To answer some of the questions posed by past research this study aims to assess whether or not opportunistic oral cancer screening by dentists to detect pre-malignant or early cancer lesions is feasible in a natural large representative sample over a specific time period. The objective was to analyse the patterns of dental attendance of a national representative sample over a period of 10 years to ascertain whether individuals at high risk of oral cancer would be accessible for opportunistic oral cancer screening.

MATERIALS AND METHODS

Data from the British Household Panel Survey (ESRC UK Longitudinal Studies Centre, 2004) for 1991–2001 were selected. BHPS is a longitudinal national study carried out by the Institute for Social and Economic Research (ISER) and the Economics and Social Research Council (ESRC) Research Centre on Micro-Social Change. Its main purpose is to understand the dynamics of change experienced by the population of Great Britain. The annual surveys started in 1991 and consisted of more than 5000 nationally representative samples of households. All members of the household aged 16 or over are interviewed. For the purpose of this study, the inclusion criteria were as follows: (1) only those who have been included in Wave One (1991–1992) of the survey were considered, and (2) out of these, only those who have involved in each successive wave onwards from Wave One up until Wave Eleven (2001–2002) were included. There were 5547 eligible people. Risk factors included were sex, age, socio-economic status (non-manual/manual), levels of education (less than secondary, secondary, degree or more), smoking status (smoker/non-smoker) and smoking intensity (number of cigarettes < 20, 20+). The BHPS did not have data on drinking patterns and consumption of vegetables and fruits. The outcome measure for this study was dental check-ups.

Data were analysed using SPSSv12 statistical software. Assessment of correlations between risk factors and dental check-up outcomes ($p < 0.05$) was carried out followed by regression analyses to describe dental check-up outcomes in relation to risk factors over 10 years.

RESULTS

Data were available for 5547 people; 2729 (49.2%) were between the ages of 16 and 40 and 2818 (50.8%) were over 40 years old (Table 1). The minimum age was 16 and the maximum was 86. Mean age was 42 ± 16 years. The number of women was 3055 (55.1%) and 2492 were men (44.9%). The majority of the sample (43%) had education up to before degree level, while the rest was divided equally into 2 groups: those who received education up to secondary schools (27.6%) and those who had a university degree and above (28.9%). In terms of social class, the number of manual workers was 2401 (43.3%). That was twice the number of non-manual workers, 1277 (23.0%).

Table 2 shows the frequency distribution of the sample by smoking status and smoking intensity. The number of non-smokers increased from 3925 (70.8%) in 1991 to 4181 (75.4%) in 2001. The opposite trend was observed for smokers where the numbers progressively declined from 1622 smokers (29.2%) in 1991 to 1366 (24.6%) in 2001. The number of subjects who smoked over 20 cigarettes per day was comparatively small compared with those who smoked 20 cigarettes or less. There was little change in the trend for both groups from 1991 to 2002.

There were 3360 people (60.6%) who went for dental check-ups in 1991 (Table 3). The number who went at least once within the next 1 year from the baseline (1991–1992) was 3160 (57.0%); 3738 (67.4%) went at least once within the next 3 years from the baseline (1991–1994), 4212 (75.9%) at least once within the next 5 years from the baseline (1991–1996) and 4549 (82.0%) at least once within the next 10 years from the baseline (1991–2001). The opposite trend was observed for non-attendees. There were 601 people (10.8%) who did not visit a dentist at all throughout the 10-year period.

Table 1 The frequency distribution of the sample, by demographic variables (n = 5547)

Variables	Categories	Number	%	Total (n)
Age	16–40 years	2729	49.2	5547
	Over 40 years	2818	50.8	
Sex	Female	3055	55.1	5547
	Male	2492	44.9	
Education*	Up to secondary school	1529	27.6	5537
	Up to before degree	2403	43.3	(99.8%)
	Degree and above	1605	28.9	
Social class*	Non-manual	1277	23.0	3678
	Manual	2401	43.3	(66.3%)

* Numbers within variables do not add up to n=5547 due to missing data; 10 subjects (0.2%) in education and 1869 subjects (33.7%) in social class.

Table 2 The frequency distribution of sample, by smoking status and smoking intensity from 1991 to 2001

Year	Smoking status		Smoking intensity*	
	Yes n (%)	No n (%)	0–20 cig/day n (%)	> 20 cig/day n (%)
1991	1622 (29.2)	3925 (70.8)	5228 (94.2)	208 (3.7)
1992	1532 (27.6)	4015 (72.4)	5247 (94.6)	194 (3.5)
1993	1490 (26.9)	4057 (73.1)	5224 (94.2)	187 (3.4)
1994	1473 (26.6)	4074 (73.4)	5251 (94.7)	183 (3.3)
1995	1492 (26.9)	4055 (73.1)	5229 (94.3)	202 (3.6)
1996	1450 (26.1)	4097 (73.9)	5264 (94.9)	197 (3.6)
1997	1421 (25.6)	4126 (74.4)	5280 (95.2)	184 (3.3)
1998	1417 (25.5)	4130 (74.5)	5275 (95.1)	190 (3.4)
1999	1400 (25.2)	4147 (74.8)	5251 (94.7)	173 (3.1)
2000	1348 (24.3)	4199 (75.7)	5239 (94.4)	191 (3.4)
2001	1366 (24.6)	4181 (75.4)	5213 (94.0)	172 (3.2)

* Numbers within the variable do not add up to n = 5547 due to missing data.

Table 3 The frequency distribution of sample by whether they made at least one dental check-up at baseline (1991), within the next year from the baseline (1991–1992), within the next 3 years from the baseline (1991–1994), within the next 5 years from the baseline (1991–1996), and within the next 10 years from the baseline (1991–2001)

		Baseline (1991) n (%)	During (1991–1992) n (%)	During (1991–1994) n (%)	During (1991–1996) n (%)	During (1991–2001) n (%)
Dental Visit	Yes	3360 (60.6)	3160 (57.0)	3738 (67.4)	4212 (75.9)	4549 (82.0)
	No	2103 (37.9)	2319 (41.8)	1663 (30.0)	1115 (20.1)	601 (10.8)
Total*		5463 (98.5)	5479 (98.8)	5401 (97.4)	5327 (96.0)	5150 (92.8)

*Total numbers at baseline do not add up to n = 5547 due to missing data.

Table 4 Correlations of risk factors for oral cancer with at least one dental check-up at baseline (1991), within the next one year from the baseline (1991–1992), within the next 3 years from the baseline (1991–1994), within the next 5 years from the baseline (1991–1996), and within the next 10 years from the baseline (1991–2001)

Variable	Baseline 1991	Next year 1991–1992	Next 3 years 1991–1994	Next 5 years 1991–1996	Next 10 years 1991–2001
Age	-0.130 ($p < 0.001$)	-0.126 ($p < 0.001$)	-0.164 ($p < 0.001$)	-0.189 ($p < 0.001$)	-0.236 ($p < 0.001$)
Sex	-0.071 ($p < 0.001$)	-0.065 ($p < 0.001$)	-0.055 ($p < 0.001$)	-0.039 ($p < 0.05$)	-0.016 *
Education	0.222 ($p < 0.001$)	0.205 ($p < 0.001$)	0.232 ($p < 0.001$)	0.250 ($p < 0.001$)	0.244 ($p < 0.001$)
Social class	-0.107 ($p < 0.001$)	-0.112 ($p < 0.001$)	-0.111 ($p < 0.001$)	-0.125 ($p < 0.001$)	-0.095 ($p < 0.001$)
Smoking status	-0.110 ($p < 0.001$)	-0.104 ($p < 0.001$)	-0.089 ($p < 0.001$)	-0.066 ($p < 0.001$)	-0.051 ($p < 0.001$)
Smoking intensity	-0.063 ($p < 0.001$)	-0.058 ($p < 0.001$)	-0.061 ($p < 0.001$)	-0.040 ($p < 0.05$)	-0.030 ($p < 0.05$)

* not significant at 5% level ($p = 0.05$)

There was a negative correlation between age and dental check-ups (Table 4). The correlation became stronger throughout the 10-year period (1991–2001). As age increased, the tendency to attend for dental check-up decreased. In all periods, those aged over 40 years old were significantly less likely to visit their dentists than people aged 40 years or below ($p < 0.001$). Also the odds ratios throughout all periods were gradually reduced (Table 5). For example, the odds ratio was 0.91 in 1991 and reduced to 0.28 in the 10-year period (1991–2001) (Table 5).

There was a negative correlation between sex and dental check-ups. Men were significantly less likely to go for dental check-ups compared with women ($p < 0.05$) (Table 5). The odds ratio was 0.58 in 1991 and did not change much within the next 10-year period (1991–2001).

There was a positive correlation between levels of education and dental check-ups (Table 4). People with higher education went for dental check-ups more regularly compared with those with lower education ($p < 0.001$). People with the least education were very unlikely to go for dental check-ups on a regular basis. Over the 10-year period (1991–2001), the trend was that those with higher education went more often for dental check-ups. The odds ratio progressively increased relative to baseline (Table 5).

There was a negative correlation between social class and dental check-ups (Table 4). The rate of dental check-ups was less in the non-manual than manual classes ($p < 0.001$). The odds ratios for people in lower social classes to go for dental check-ups were progressively reduced from 0.68 in 1991 to 0.54 in the 10-year period.

There was a negative correlation between smoking status and dental check-ups. Smokers were significantly less likely to go for dental check-ups compared with non-smokers ($p < 0.001$). The trend remained unchanged over the 10-year period (1991–2001). The odds ratio was 0.65 in 1991 and 0.62 in the 10-year period (Table 5).

There was a negative correlation between smoking intensity and dental check-ups. Those who smoked more than 20 cigarettes per day were significantly less likely to go for dental check-ups compared with those who smoked 20 cigarettes or less ($p < 0.05$). The trend remained unchanged over the 10-year period (1991–2001) (Table 4). However, from the logistic regression models (Table 5), the effect of smoking heavily did not produce the same outcome as expected. Initially, heavy smokers were relatively less likely to attend for dental check-ups. The odds ratio was 0.89 in 1991. However, as time progressed, their odds ratio increased to 1.52 for making at least one visit within a

Table 5 Logistic regression models for attending for a dental check-up at least once at baseline (1991), within the next one year from baseline (1991–1992), within the next 3 years from baseline (1991–1994), within the next 5 years from baseline (1991–1996), and within the next 10 years from baseline (1991–2001) by demographic variables

Variables		Baseline OR (95% CI)	Next year OR (95% CI)	Next 3 years OR (95% CI)	Next 5 years OR (95% CI)	Next 10 years OR (95% CI)
Age (years)	16–40	1	1	1	1	1
	> 40	0.91 (0.78–1.06)	0.86 (0.75–1.00)	0.77 (0.65–0.91)	0.62 (0.51–0.76)	0.28 (0.21–0.37)
Sex	Female	1	1	1	1	1
	Male	0.58 (0.51–0.67)	0.61 (0.53–0.70)	0.59 (0.51–0.69)	0.58 (0.48–0.70)	0.55 (0.42–0.72)
Education	Up to secondary school	1	1	1	1	1
	Secondary school	1.83 (1.51–2.21)	1.67 (1.38–2.02)	1.89 (1.55–2.31)	1.93 (1.54–2.42)	1.81 (1.34–2.44)
	Degree & Above	1.86 (1.49–2.34)	1.91 (1.53–2.39)	2.16 (1.70–2.76)	2.35 (1.76–3.14)	2.56 (1.70–3.83)
Social class	Non-manual	1	1	1	1	1
	Manual	0.68 (0.57–0.81)	0.71 (0.60–0.85)	0.68 (0.56–0.82)	0.55 (0.43–0.70)	0.54 (0.38–0.76)
Smoking status	Non-smoking	1	1	1	1	1
	Smoking	0.65 (0.55–0.76)	0.68 (0.58–0.80)	0.68 (0.56–0.81)	0.73 (0.59–0.90)	0.62 (0.46–0.82)
Smoking intensity	0–20 cig/day	1	1	1	1	1
	> 20 cig/day	0.89 (0.61–1.28)	0.99 (0.68–1.42)	0.81 (0.55–1.18)	1.15 (0.73–1.81)	1.52 (0.81–2.82)

10-year period. This finding suggests that heavy smokers are infrequent dental attendees except for every 5 to 10 years.

DISCUSSION

In this study, effects of alcohol and fruits and vegetables consumptions on dental attendance over 10 years were not included. Alcohol intake is a well-known risk factor for oral cancer, whilst fruits and vegetables contain essential anti-oxidants that promote healing (Doll, 1992). Although both are essential parameters whose inclusion would affect the overall risk assessment, they were not included in this study because both were not incorporated in the BHPS questionnaire and as a result their overall impact and assessment could not be analysed. However, available evidence suggests that excessive drinking and smoking commonly go together. People who smoke heavily are more likely to drink excessively (Gregory et al, 1990). Also, they are more likely to eat a diet high in fats and sugars and low in fibres, polyunsaturated fatty acids, fruits and nutrient-rich foods that contain anti-oxidants (Cade and Margetts, 1991). Therefore, in relation to these two parameters, it could be said that people who smoke heavily will more likely than not consume excessive alcohol and eat an unhealthy diet.

In this study, people who are considered to be at higher risk of oral cancer were much less likely to attend for dental check-ups compared with those at low risk over a 10-year period, and therefore allow screening for oral cancer. Men, those over 40 years old, less educated, manual workers and smokers were less likely to attend for dental check-ups compared with women, young, highly educated, coming from higher socio-economic class and non-smokers. This finding is consistent with those of other studies on the subject

(Haughney et al, 1998). In America, a similar finding on smokers and dental attendance was reported by Drilea et al (2005) in a study that included a national representative sample of 15250 adults. As high-risk individuals of oral cancer are not regular attendees in the long term, their impact to opportunistic screening and prevention by general dental practitioners in the UK could be significant.

Dentists, on the other hand, should not disregard the importance of oral mucosal examination and should not refrain themselves from looking for potentially malignant lesions in all patients whether or not they belong to any known risk group. This is because there are a small number of cases where oral pre-cancers and cancers are found in low-risk individuals who are regular attendees. Previous studies have shown that non-smokers presenting with oral leukoplakia run a greater risk to contract squamous cell carcinoma (Wright and Shear, 1985). Early detection and referral by general dental practitioners may have had an impact on the treatment outcome.

On the brighter side, the results of this study should be looked at as an opportunity for better intervention by all health advocates, including educational campaigns, media and the government. For example, more should be done to encourage high-risk individuals to see their dentists. The percentage of smokers in the sample (29% in 1991) (Table 2) coincided with the national percentage (Department of Health, 2003) and it is worrying that a similar trend exists in the whole population. To start with, we could look into our current oral health campaigns. If necessary they need to be revised and improved. In addition to health education and self-examination the overall emphasis should focus on regular dental visits. Tobacco and alcohol campaigns should embrace a similar objective. Health advocates could augment the efforts of dentists by incorporating more recognition of the effect of excessive use of tobacco and alcohol consumption on oral health, such as gum problems, staining of teeth, dry mouth, tooth loss, ulceration and oral cancer, and hence the importance of regular dental visits. High-risk groups, including ethnic minorities, should be targeted as priority groups. Dentists, on the other hand, could play a vital role in the whole process. Apart from opportunistic screening, they could also perform evidence-based 4 A's technique in smoking cessation (Watt et al, 2003); many dentists have become successful in persuading light smokers to stop.

This multi-sectorial involvement with campaigns directed at promoting positive behaviours and self-empowerment should take priority. Apart from providing useful information and transferring knowledge to the public, new ideas on how best to promote sustained behavioural change is vital. The government, including policymakers and social services, could play a vital role. For example, they could impose a safety net by means of compulsory dental check-ups, at least once every 2 years, if not annually, for people on social benefits in return for the help they receive. This particular group is most at risk and more likely than not to constitute the high-risk groups of oral cancer. By making dental check-ups compulsory, it allows the poor and socially disadvantaged people to benefit from opportunistic oral screening and be given help if necessary.

As it is evident that not everyone visits a dentist regularly, opportunistic screening by dentists at the present time is not the best method to calculate the actual number of oral cancers in the population and hence the incidence or prevalence of oral cancers. Fortunately, as dentists screen patients during check-ups, the economic resources of finding one case of squamous cell carcinoma in relation to the costs for the extra time of an examination of the oral mucosa would not be substantial as oral mucosal examination is part of routine dental check-up. As dental check-up is inexpensive and relatively accessible in the UK, the feasibility and effectiveness of opportunistic screening would only be improved by persuading the whole population, especially the high-risk groups, to become available for routine dental check-ups.

CONCLUSION

Following recommendations by various organisations for general dental practitioners to opportunistically screen their patients for signs of oral pre-cancers and cancers, the evidence suggests that this is not feasible to include the high-risk groups as they are not regular attendees. Those who would be screened would be the low-risk groups. However, dentists should continue screening all patients as oral pre-cancers are also found in regular attendees. More should be done to encourage the high-risk groups to visit their dentists. Among other ways, a safety net could be introduced by means of compulsory dental check-ups for disadvantaged people, for example those claiming social benefits.

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