

Differences by age and sex in general dental practitioners' knowledge, attitudes and behaviours in delivering prevention

H. Yusuf,¹ G. Tsakos,¹ A. Ntouva,¹ M. Murphy,¹ J. Porter,¹ T. Newton² and R. G. Watt*¹

IN BRIEF

- Examines NHS dentists' knowledge, attitudes, behaviours and perceived barriers in delivering preventive care.
- Reports that although respondents had limited knowledge of preventive topics, they had positive attitudes towards delivering prevention.
- Highlights that younger and female dentists were significantly more likely to provide a range of preventive care than their older and male counterparts.

Purpose To assess sex and age differences in NHS dentists' knowledge, attitudes and behaviours in providing preventive care. **Materials and methods** A cross-sectional questionnaire survey was conducted with dentists working in North London, UK. **Results** The sample displayed limited knowledge in certain key aspects of prevention, but expressed generally positive attitudes towards preventive care. More female and younger dentists reported that a child should attend the dentist before the age of 3 years ($p = 0.03$ and $p = 0.04$, respectively). No other differences in knowledge or attitudes were found by age and sex. The majority of the sample reported routinely providing oral hygiene (95.7%), diet (85.4%) and smoking cessation advice (76.7%), but provision of alcohol advice was much less common (38%). A significantly higher proportion of younger dentists were more likely to give diet advice ($p = 0.03$) and smoking cessation support ($p = 0.009$) than their older colleagues. Female dentists were more likely to provide fissure sealants ($p = 0.04$), diet advice ($p = 0.02$) and smoking cessation support ($p = 0.03$). The main perceived barriers were related to organisational factors including insufficient remuneration (86.3%), lack of time (84%) and poor patient compliance (66%). There were no significant differences in perceived barriers by sex, but younger dentists were significantly more likely to identify poor patient compliance as a barrier ($p = 0.02$). **Conclusion** Although dentists in this study may lack some core preventive knowledge, many expressed very positive attitudes towards prevention and reported to be routinely offering a range of preventive measures. Younger and female dentists tended to engage more frequently in preventive activities.

INTRODUCTION

Oral diseases remain a significant public health problem in many parts of the world, including the UK.¹ In particular dental caries and periodontal diseases are both highly prevalent chronic conditions that have a significant adverse impact on quality of life.² Dental treatment is costly and each year over £3.4 billion is spent on NHS dentistry in the UK. However, oral diseases are largely preventable.³ Dental caries, periodontal diseases and oral cancers are caused by a combination of poor oral hygiene, diets high in free sugars, lack of fluoride, tobacco use and excess alcohol consumption. Indeed oral diseases share common behavioural risks with other non-communicable conditions such as cardiovascular disease, diabetes and

certain cancers.⁴ Primary dental care teams have regular on-going contact with a high proportion of the 'healthy' child and adult population who often may not be seen by other healthcare professionals. They are therefore ideally suited to provide appropriate advice to their patients on the promotion of both oral and general health. Evidence-based preventive guidelines for dental teams have been published and widely disseminated⁵ and the reorientation of dental services towards a more preventive approach is now a major NHS policy priority.⁶

Dentists have delivered prevention for over 50 years,⁷ but this has traditionally focused largely on the use of clinical preventive measures such as fluorides, fissure sealants and oral hygiene advice.⁸ More recently dentists have broadened their preventive activities in line with the adoption of a common risk factor approach and delivered diet, tobacco, and to a lesser extent alcohol advice to their patients.⁹⁻¹² However, the proportion of their time dedicated to prevention and the range of preventive activities routinely delivered varies widely.^{8,10}

Although dentists increasingly acknowledge that they have a professional role to

play in prevention, a wide array of barriers still limit their active involvement.^{10,13} Key barriers include lack of knowledge and skills among dental professionals, concerns over the effectiveness of prevention, time and cost pressures, lack of supporting resources, and organisational factors including insufficient financial incentives.^{9,14-16}

Evidence has also shown that demographic characteristics of health professionals may influence the provision of preventive care. The majority of studies in this area have focused on doctors working in primary care. For example, studies have shown that female doctors were more engaged in delivering preventive care than their male colleagues, especially for their female patients.^{17,18} In contrast, a survey of European doctors, found that male doctors were generally more involved in preventive services than females. However, female general medical practitioners were more likely to be involved in preventive clinics which provided smoking, alcohol, and diet advice than male doctors.¹⁹ In terms of the clinicians age, a study among US physicians found those under the age of 50 years were more engaged in the assessment of their patients alcohol, smoking and

¹Department of Epidemiology & Public Health, UCL, 1-19 Torrington Place, London, WC1E 6BT; ²Division of Health and Social Care Research, King's College London Dental Institute, Caldecott Road, London, SE5 9RW, UK
*Corresponding author: Professor Richard Watt
Tel: 020 7067 1996; Fax: 020 7813 0280
Email: r.watt@ucl.ac.uk

drug use than their older colleagues.²⁰ In dentistry very few studies have examined any association between clinicians sex and age, and provision of preventive care. A Canadian study showed that female and younger dental clinicians were more likely to give smoking cessation advice than their male and older colleagues.²¹ Younger US dentists were also more likely to advise their patients to quit tobacco than older clinicians.²²

More information is needed on dentists' preventive knowledge, attitudes and practices to inform future policy initiatives aimed at further developing and extending the role of dental professionals in prevention. There have been a limited number of studies exploring the broader preventive agenda in primary dental care settings.⁹⁻¹¹ Most studies have focused narrowly on specific preventive activities such as fluoride applications, fissure sealants, smoking cessation or brief alcohol advice. Furthermore, there have been very few published studies assessing associations between the dentists' demographic characteristics namely sex and age and the provision of preventive care. The objectives of this study were therefore to assess dentists' knowledge, attitudes and behaviours in delivering a range of preventive activities and the degree to which this varied by the sex and age of the practitioners.

MATERIALS AND METHODS

A questionnaire survey targeting all NHS general dental practitioners working in Camden, Islington and Haringey in North Central London was carried out between September 2011 and February 2012, following approval by the Camden and Islington Community Research Ethics Committee (10/H0722/2).

A self-administered questionnaire was developed based upon previous studies on prevention in general dental practice.^{9,14} The questionnaire included sections assessing dentists' knowledge and attitudes towards prevention, current preventive activities, perceived barriers limiting prevention and demographic characteristics of the sample. The provision of fissure sealants, topical fluorides, oral hygiene, diet, smoking cessation and alcohol advice were all included in the knowledge, attitudinal and practice questions. Prior to the main study, the questionnaire was piloted with a group of dental practitioners in a neighbouring locality.

All 352 NHS general dental practitioners registered to provide dental care in the three areas were sent an introductory letter, an information sheet, a self-administered questionnaire and a pre-paid return envelope. Private dentists, hospital and community dentists were excluded from the study.

Table 1 Characteristics of the study sample

Characteristics	Proportion (%)
Gender (n = 160)	
Male	60.0
Female	40.0
Age groups (n = 161)	
Under 30	17.4
30-39	32.9
40-49	24.8
50-59	17.4
60+	7.5
Place of qualification (n = 140)	
UK	62.9
Europe	21.4
Other countries	15.7

Table 2 Dentists' preventive knowledge by age and sex

	% Responded correctly						
	Overall	Age groups (n = 161)			Sex (n = 160)		
		<39 years	40+ years	P	Male	Female	P
Fluoride concentration in toothpaste for 5-year-olds (n = 151)	48.3	47.4	47.9	0.94	47.2	47.5	0.98
Maximum recommended frequency of sugar consumption per day (n = 161)	25.5	24.1	27.8	0.59	24.5	28.6	0.57
Necessity of training to deliver effective tobacco cessation advice (n = 159)	55.3	54.4	55.8	0.86	59.8	47.6	0.14
Recommended timing of child's first dental visit (n = 161)	72.7	79.7	64.6	0.03	66	81	0.04
Frequency of fluoride varnish application for 3-year-olds (n = 161)	52.2	51.9	50.6	0.87	51.1	52.4	0.87

Table 3 Dentists' attitudes towards preventive activities by age and sex

	% Strongly agree/Agree						
	Overall	Age groups (n = 161)			Sex (n = 160)		
		<39 years	40+ years	P	Male	Female	P
Role of dentists in smoking cessation (n = 161)	89	92.6	85.0	0.13	85.4	93.8	0.10
Role of dentists in delivering alcohol advice (n = 164)	69.5	70.4	67.5	0.69	68.8	70.3	0.83
Perception that clinical colleagues provide prevention (n = 159)	71.1	68.8	73.7	0.50	70.7	71.4	0.92
Levels of confidence in practising prevention (n = 163)*	95.1	95.1	94.9	1	93.8	96.8	0.48

*Fisher's exact test

Table 4 Dentists provision of preventive activities by age and sex

	% Always/Frequently							
	Overall	Age groups			P	Sex		P
		<39 years	40+ years			Male	Female	
Fissure sealants (n = 163)	47.2	48.8	46.2	0.75	40.6	57.1	0.04	
Topical fluoride (n = 163)	52.1	52.5	51.2	0.87	45.8	60.3	0.07	
Oral hygiene instructions (n = 164)*	95.7	98.8	92.5	0.06	93.8	98.4	0.24	
Diet advice (n = 164)	85.4	91.4	78.8	0.03	80.2	93.8	0.02	
Tobacco advice (n = 163)	76.7	85.0	67.5	0.009	70.8	85.7	0.03	
Alcohol advice (n = 163)	38.0	43.8	32.5	0.14	35.4	42.9	0.35	

*Fisher's exact test

Table 5 Perceived barriers to the provision of prevention by age and sex

	% Strongly agree/Agree							
	Overall	Age groups			P	Sex		P
		<39 years	40+ years			Male	Female	
Lack of time (n = 162)	84	87.5	82.3	0.36	83.3	87.1	0.52	
Lack of remuneration (n = 161)	86.3	89.9	83.5	0.24	84.4	90.2	0.30	
Lack of motivation (n = 162)	13	8.8	17.7	0.10	16.7	8.1	0.12	
Poor patient compliance (n = 162)	66	75	57	0.02	63.5	69.4	0.45	
Likely to alienate patients (n = 161)	21.1	20.3	21.5	0.85	21.9	19.7	0.74	
Lack of knowledge (n = 160)*	3.8	1.3	6.4	0.12	4.2	3.3	1	
Lack of confidence (n = 162)*	3.1	1.2	5.1	0.21	3.1	3.2	1	
Lack of training (n = 160)	11.9	10	14.3	0.41	14.9	8.1	0.20	

*Fisher's exact test

Recommended procedures to maximise response rates in postal questionnaires were followed.²³ The questionnaire was mailed out on three occasions to encourage the sample to complete and return their questionnaires.

Descriptive analysis was carried out and chi-squared and Fisher's exact tests were used to assess differences in the knowledge, attitudes and provision of various preventive measures and barriers to delivering prevention by age group (<39 years vs. 40 years plus) and sex. A significance level of 0.05 was adopted in the analysis.

RESULTS

Out of the 352 dentists invited to participate, 52 were excluded because they were either on maternity leave/sick leave, had terminated their employment, or were working in multiple practices in the area, giving 300

eligible respondents. Overall, 164 completed questionnaires were received, a response rate of 55.0%. The sample characteristics are shown in Table 1. The sample contained more males (60.0%) and there was a broad variation in age with nearly a third of the sample (32.9%) aged 30–39 years. In terms of the country where their primary dental qualification was obtained, more than half (62.9%) had qualified in the UK, 21.4% in other European countries and 15.7% outside of Europe.

Overall, the sample displayed a generally poor level of knowledge of core issues related to prevention (Table 2). For example, only a quarter (25.5%) of the dentists correctly identified that the current recommendations state that the maximum frequency of free sugars should be four times per day. Around half of the sample correctly answered questions

on the importance of training in delivering smoking cessation advice (55.3%), on the recommended frequency of fluoride varnish applications for children aged over 3 years (52.2%) and recommended fluoride concentration in toothpastes for 5-year-old children (48.3%). A majority correctly reported that a child should attend the dentist before the age of 3 years (72.7%). Significantly, more younger and female dentists answered this question correctly ($p = 0.03$ and $p = 0.04$ respectively). No other significant differences were found on levels of knowledge by age and sex of the sample.

In terms of the sample's attitudes towards prevention, overall they displayed a very positive view with the vast majority reporting that dentists had a role to play in providing dietary (99.4%) and smoking cessation advice (89%) to their patients (Table 3). Very high levels of confidence in delivering prevention (95.1%) and the perception that their clinical colleagues routinely provided preventive advice (95.1%) were also reported. A lower proportion of respondents (69.5%) felt that dentists had a role to play in delivering alcohol advice. It was interesting to note that younger and female dentists held consistently more positive attitudes towards prevention, but none of these differences was statistically significant.

Reported levels of delivering different preventive activities varied considerably (Table 4). The vast majority of the sample reported that they always or frequently provided oral hygiene (95.7%), dietary (85.4%) and tobacco advice (76.7%) to their patients. Around half reported always or frequently providing topical fluorides (52.1%) and fissure sealants (47.2%). In contrast, only 38% of the sample reported the same for delivering alcohol advice. Younger dentists aged under 39 years were more likely to provide diet advice (91.4% vs. 78.8%; $p = 0.03$) and tobacco cessation support (85% vs. 67.5%; $p = 0.009$) than their older colleagues aged 40 years and over. Female dentists were more likely to provide fissure sealants (57.1% vs. 40.6%; $p = 0.04$), diet advice (93.8% vs. 80.2%; $p = 0.02$) and tobacco cessation support (85.7% vs. 70.8%; $p = 0.03$) than male dentists.

Three key barriers were identified by the sample as factors limiting their further engagement in preventive care: inadequate remuneration (86.3%), lack of time (84%) and concern over poor patient compliance (66%) (Table 5). In contrast, clinician-related barriers including lack of training or knowledge, low levels of confidence or poor motivation were not considered to be major barriers by the vast majority of the sample. There were no significant associations between

perceived barriers and either age group or sex, with the exception of poor patient compliance which varied by age, with a significantly higher proportion of younger dentists (75%) perceiving it as a barrier compared to the older age group (57%) ($p = 0.02$).

DISCUSSION

This study examined NHS dentists' knowledge, attitudes, practices and perceived barriers in delivering a range of preventive care, and the extent to which this varied by the sex and age of the clinicians. Overall, the sample displayed only limited knowledge in a range of basic preventive topics but generally held a very positive attitude towards preventive care, with the exception of alcohol brief advice where more mixed views were expressed. The dentists reported routinely providing oral hygiene, diet and smoking cessation advice but again provision of advice in relation to alcohol was considerably less frequent. No differences in levels of knowledge or attitudes were found in terms of the age and sex of the practitioners, but younger and female dentists were significantly more likely to provide a range of preventive care than their older and male colleagues.

Most of the previous research that has focused on prevention has concentrated on exploring dentists' general attitudes towards preventive care⁹⁻¹¹ and perceived barriers.¹⁴⁻¹⁶ Assessment of dentists' knowledge has tended to focus on very specific preventive issues such as oral cancer or HPV screening.^{24,25} This study has revealed rather worryingly low levels of knowledge on basic preventive messages that are core elements of recommended NHS evidence-based preventive practice.⁵ In particular, approximately half the sample were not familiar with the recommendations on the fluoride concentration for toothpastes and the recommended frequency of applying fluoride varnish for young children. Only a quarter were aware of the WHO and the Department of Health's recommendation on the maximum daily frequency of free sugars consumption.^{5,26} This is a particular concern given the priority now being placed on reducing sugar consumption for both caries and obesity prevention.

In contrast, the sample displayed very positive general attitudes towards most areas of prevention and also reported high levels of routinely providing preventive care. These findings are very much in support of previous studies,⁹⁻¹¹ and indicate a general positive shift in NHS dentists' views towards prevention. In particular, it is notable how the provision of smoking cessation advice has now become a recognised core element

of routine clinical practice for most NHS dentists.²⁷ On the other hand, dental practitioners appear to have more mixed views towards providing alcohol advice and few routinely offer this to their patients.^{8,9,12} Although dentists may recognise the negative impact alcohol consumption may have on oral health, concerns about adversely affecting the dentist-patient relationship and a lack of knowledge and training in this area limits their involvement.¹² Our findings on the perceived importance of NHS organisational and funding issues as key barriers limiting the further provision of preventive care is in accordance with previous studies in the UK.^{11-13,15-16} Currently an NHS dental pilot programme is being implemented across England which is evaluating different models of dental care in which greater emphasis is being placed upon prevention. Informed by the results of this pilot programme, a reformed NHS dental contract is likely to be introduced from 2016 in which greater emphasis will be placed upon prevention through an appropriate funding mechanism. This development will hopefully help address a major obstacle to the delivery of prevention in NHS dental practices.

Very few studies have assessed differences in demographic characteristics of dental professionals in relation to their views and engagement in prevention.^{21,22} Although we found consistently more positive views among younger and female dentists, the only significant differences were in relation to the provision of certain preventive measures. In recent years the dental undergraduate curriculum has been updated in line with General Dental Council guidance²⁸ and greater emphasis is undoubtedly placed upon prevention, communication skills and dental public health. Younger dentists qualified in the last 10 years will therefore have received more training on preventive issues than older dentists who were trained in a more traditional curriculum. This may well help to explain why younger dentists in our sample were more likely to provide diet advice and smoking cessation support than their older colleagues. Other studies have also shown that younger dentists are more likely to be engaged in smoking cessation advice.^{21,22} We also found that female dentists were more likely to offer fissure sealants, diet advice and smoking cessation support than males. This supports the results of a Canadian study which also showed that female dentists were more likely to offer smoking advice to their patients than male colleagues.²¹ Research with medical professionals has highlighted that females are more likely to engage with prevention, possibly due to their greater

interest in person-centred care and use of counselling techniques.^{18,29-30}

Few published studies have assessed dentists' knowledge, attitudes and practices towards a range of preventive activities and explored any age or sex differences. Our findings, however, need to be interpreted with a degree of caution due to study limitations. Despite implementing a range of recommended measures to increase questionnaire responses, we only achieved a response rate of 55.0%. This is in line with findings from a review of surveys sent to dentists, which found the response rate varied from 17% to 100%.³¹ The dentists who responded to our survey are more likely to be interested and motivated in prevention than non-responders so it is likely that we have overestimated levels of engagement and attitudes towards prevention. Our sample was also only from three areas of north central London and is therefore not generalisable to other parts of the country. Finally, although the questionnaire was carefully designed and informed by previous studies, all the activity measures were self-reports and may have given inflated figures.

In conclusion, this study has shown that although NHS dentists may lack some core preventive knowledge, many expressed very positive attitudes towards prevention and reported to be routinely offering a range of preventive measures to their patients. Younger and female dentists tended to engage more frequently in preventive activities. Tailored training programmes to improve dental professionals knowledge and understanding of evidence based preventive messages are needed.³² The planned reform of the NHS dental contract may help to address current organisational barriers to prevention.

Acknowledgements

The research team would like to thank all the NHS dentists who responded to the questionnaire and to the local commissioning team for their support.

This paper presents independent research funded by the National Institute for Health Research (NIHR) under its Research for Patient Benefit (RfPB) Programme (Grant Reference Number- PB PG 1207 14,085). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

1. Marcenes W, Kassebaum N J, Bernabé E *et al*. Global burden of oral conditions in 1990-2010: a systematic analysis. *J Dent Res* 2013; **92**: 592-597.
2. Steele J G, Treasure E T, O'Sullivan I *et al*. Adult dental health survey 2009: transformation in British oral health 1968-2009. *Br Dent J* 2012; **213**: 523-527.
3. Oral health: prevention is key. (Editorial). *The Lancet* 2009; **373**: 1.
4. Sheiham A, Watt R G. The common risk factor approach: a rational basis for promoting oral health. *Community Dent Oral Epidemiol* 2000; **28**: 399-406.
5. Public Health England. *Delivering better oral health: an evidence based toolkit for prevention*. (3rd ed). London: Public Health England, 2014.

6. Steele J, Rooney E, Clarke J *et al.* *NHS dental services in England: an independent review led by Professor Jimmy Steele*. London: Department of Health, 2009.
7. Miller J. Prevention for the individual practitioner. *Br Dent J* 1973; **134**: 181–187.
8. Fox C. Evidence summary: what do dentists mean by 'prevention' when applied to what they do in their practices? *Br Dent J* 2010; **208**: 359–363.
9. Dyer T A, Robinson P G. General health promotion in general dental practice: the involvement of the dental team Part 2: A qualitative and quantitative investigation of the views of practice principals in South Yorkshire. *Br Dent J* 2006; **201**: 45–51.
10. Anderson R, Treasure E T, Sprod A S. Oral health promotion practice: a survey of dental professionals in Wales. *Int J Health Promotion Educ* 2002; **40**: 9–14.
11. Tomlinson P, Treasure E T. Provision of prevention to adults in NHS dental practices and attitudes to prevention. *Br Dent J* 2006; **200**: 393–397.
12. Shepherd L, Young J E, Clarkson J E *et al.* General dental practitioner views on providing alcohol related health advice; an exploratory study. *Br Dent J* 2010; **208**: E13.
13. Yusuf H, Murphy M, Ntouva A *et al.* An ethical dilemma: our current understanding of prevention in primary dental care. A qualitative study. *Soc Sci Dent* 2014; **3**: 17–26.
14. Chestnutt I G, Binnie V I. Smoking cessation counselling: a role for the dental profession? *Br Dent J* 1995; **179**: 411–415.
15. Watt R G, McGlone P, Dykes J, Smith M. Barriers limiting dentists' active involvement in smoking cessation. *Oral Health Prev Dent* 2004; **2**: 95–102.
16. Witton R V, Moles D R. Barriers and facilitators that influence the delivery of prevention guidance in health service dental practice: a questionnaire study of practising dentists in Southwest England. *Community Dent Health* 2013; **30**: 71–76.
17. Keane D, Woodward C A, Ferrier B M *et al.* Female and male physicians: different practice profiles. *Can Fam Physician* 1991; **37**: 72–81.
18. Maheux B, Dufort E, Beland F *et al.* Female medical practitioners: more preventive and patient oriented? *Med Care* 1990; **28**: 87–92.
19. Boerma W, van den Brink-Muinen A. Gender-related differences in the organization and provision of services among general practitioners in Europe: a signal to health care planners. *Med Care* 2000; **38**: 993–1002.
20. Ewing G, Selassie A, Lopez C *et al.* Self-report of delivery of clinical preventive services by U S. physicians. Comparing speciality, gender, age, setting of practice, and area of practice. *Am J Prev Med* 1999; **17**: 62–72.
21. Brothwell D, Gelskey S C. Tobacco use cessation services provided by dentists and dental hygienists in Manitoba: part 1. Influence of practitioner demographics and psychosocial factors. *J Can Dent Assoc* 2009; **74**: 905.
22. Prakash P, Belek M G, Grimes B *et al.* Dentists' attitudes, behaviours and barriers related to tobacco use cessation in the dental setting. *J Public Health Dent* 2013; **73**: 94–102.
23. Edwards P J, Roberts I, Clarke M J *et al.* Methods to increase response to postal and electronic questionnaires. *Cochrane Database Syst Rev* 2009; **8**: DOI: 10.1002/14651858.MR000008.
24. Daley E, Dodd V, DeBate R *et al.* Prevention of HPV-related oral cancer: assessing dentists' readiness. *Public Health* 2014; **128**: 231–238.
25. Macpherson L M, McCann M F, Gibson J *et al.* The role of primary healthcare professionals in oral cancer prevention and detection. *Br Dent J* 2003; **195**: 277–281.
26. WHO. *Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation*. Geneva: WHO Publications, 2003.
27. Public Health England. *Smokefree and Smiling. Helping dental patients to quit tobacco*. (2nd ed). London: PHE Publications, 2014.
28. General Dental Council. *Preparing for practice: dental teams learning outcomes for registration*. London: General Dental Council, 2011.
29. Weisman C S, Teitelbaum M A. Physician gender and the physician-patient relationship: recent evidence and relevant questions. *Soc Sci Med* 1985; **20**: 1119–1127.
30. Frank E, Harvey L K. Prevention advice rates of women and men physicians. *Arch Fam Med* 1996; **5**: 215–219.
31. Tan R, Burke F J T. Response rates to questionnaires mailed to dentists. A review of 77 publications. *Int Dent J* 1997; **47**: 349–354.
32. Watt R G, D'Cruz L, Rai A, Jones A. Reflections on a training course reorienting dental teams towards prevention. *Br Dent J* 2015; **218**: 25–28.