

Australian dentists' views on toothbrush wear and renewal

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Abstract

The purpose of this study was to survey the views of Australian dentists on toothbrush wear, toothbrush renewal periods and recommendations to patients and to investigate the relationship between dentists' views on patients' toothbrush renewal intervals and dentists' own renewal habits. Questionnaires were mailed to 5,596 Australian general dental practitioners and replies received from 3,406 (61 per cent response rate). The majority of respondents (85.7 per cent) felt patients should renew their toothbrushes more often. However, only 45.3 per cent usually made a recommendation to their patients as to when they should renew their toothbrush and only 41.7 per cent thought patients actually followed such recommendations. Most respondents (56.6 per cent) thought the average adult patient should renew a toothbrush every two-three months. A renewal period of one month or earlier was recommended by 23.8 per cent of dentists; four-five months by 8 per cent; and six months or longer by 11.5 per cent. A highly significant correlation was found between the renewal periods recommended for patients and the intervals selected by the dentists for their personal brushes ($p < 0.001$; chi-square test). Bending and splaying of bristles was the sign identified by the majority of dentists (70 per cent) as indicating the need for a new brush. The findings suggest dentists' recommendations concerning toothbrush renewal intervals may be based on their own toothbrush renewal habits. It is also concluded that dentists think patients comply poorly with their recommendations on toothbrush renewal.

Key words: Toothbrush, toothbrush wear, dentists' attitudes, oral hygiene.

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Introduction

Personal oral hygiene is a key factor in the long-term preservation of periodontal health.¹ Despite the widespread use of toothbrushes in self-performed plaque control,² few published studies have investigated what recommendations dentists make to patients about how often toothbrushes should be renewed.^{3,4} In these studies, one involving dentists and dental hygienists in Chicago³ and the other involving periodontists and dental hygienists in Australia,⁴ the majority of respondents recommended toothbrushes be renewed every two-three months. Both studies suggested a trend for dental professionals to recommend renewal periods similar to the periods at which they renewed their own brushes. Since education of the patient about self-performed plaque control is considered an important aspect of dental treatment,⁵ the purpose of this study was to survey the views of general dentists on toothbrush wear, toothbrush renewal periods and recommendations to patients. A specific aim of the study was to investigate any relationship between dentists' views on how often patients should renew their brushes and dentists' personal toothbrush renewal intervals.

Materials and methods

A questionnaire containing closed questions was mailed to all 5,596 general dental practitioner members of the Australian Dental Association. A letter accompanied each questionnaire explaining the reasons for the study and stating approval for the investigation had been granted by The University of Sydney Human Ethics Committee. Dentists were informed the survey was anonymous and related only to manual toothbrushes.

Participants were asked:

1. Which one of the following signs do you look for to indicate the need for a new brush? (Signs listed in Table 1.)
2. Do you feel that patients should renew their toothbrushes more often?

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Table 1. Responses of 3,406 dentists to question on signs of toothbrush wear*

Signs of toothbrush wear	n	%
Bristles causing trauma to the gingiva	120	3.5
Bristles no longer removing plaque	539	15.8
Bristles bent or splaying (spread out)	2385	70.0
Bristles being too soft	82	2.4
Other	52	1.5
Nil response	228	6.8
Total	3406	100

*Question: 'Which one of the following signs do you look for to indicate the need for a new brush?'

3. Do you usually recommend to your patients when they should renew their toothbrush?

4. Do you think patients usually follow your recommendations about renewing toothbrushes?

5. When do you think the average adult patient should renew his/her toothbrush?

6. When do you on average renew your toothbrush?

A reply-paid envelope was provided with each questionnaire. No follow-up letters or second mailings of questionnaires were undertaken. As each questionnaire was returned, it was numbered for identification purposes and the responses entered on to a computerized database using the SAS system.⁶

Statistical analysis

Association between the renewal periods selected by the respondents for their own brushes and the periods recommended for patients was investigated using the chi-square test.

Results

Questionnaires were returned by 3,406 dentists, representing a response rate of 61 per cent. Not all respondents answered all questions.

The majority of respondents (70 per cent) identified bent or splaying bristles as the indicator for a new toothbrush (Table 1). The majority of respondents (85.7 per cent) felt patients should renew their toothbrushes more often (Table 2). However, only 45.3 per cent usually recommended to patients when toothbrushes should be renewed. A minority of the respondents (41.7 per cent) thought patients usually followed these recommendations (Table 2).

Toothbrush renewal intervals recommended for patients and selected for the dentists' own brushes are shown in Fig 1. Renewal intervals recommended

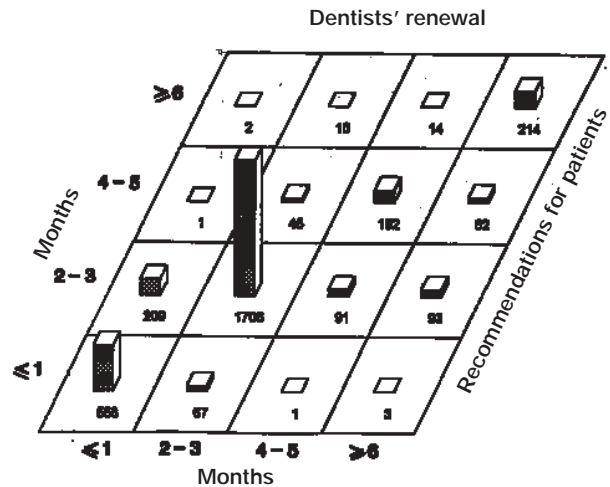


Fig 1. - The intervals recommended by dentists for toothbrush renewal are shown in relation to their choice of renewal intervals for their own toothbrushes (n=3,228). A chi-square test showed this relationship was highly significant (p<0.001).

for patients ranged from less than one month to more than six months with renewal periods of two or three months selected by the majority of respondents (56.6 per cent). A renewal period of one month or earlier was recommended by 23.8 per cent; four-five months by 8 per cent; and six months or longer by 11.5 per cent. It was found that 81.5 per cent of respondents recommended the same intervals as they used for their own brushes. A chi-square test showed a highly significant association between the dentists' own renewal periods and the intervals they recommended for patients (p<0.001).

Discussion

The majority of respondents thought patients should renew their toothbrushes every two-three months, a finding similar to the reports of previous studies of dentists and dental hygienists in Chicago³ and of periodontists and hygienists in Australia.⁴ The similarity observed in those studies between respondents' toothbrush replacement intervals and the intervals selected for patients was confirmed in the present study which found a highly significant relationship between the dentists' own toothbrush renewal intervals and the intervals suggested for patients. For example, of the 240 dentists who thought patients should renew their toothbrushes at intervals of six months or more, 214 renewed their brushes at the same interval. This finding suggests that recommendations about how often the average

Table 2. Responses of 3,406 dentists to questions on toothbrush renewal recommendations to patients and patients' compliance

Questions*	Yes	No	N/R†
Should renew toothbrushes more often?	2918 (85.7%)	372 (10.9%)	116 (3.4%)
Usually recommend to patients?	1544 (45.3%)	1836 (53.9%)	26 (0.8%)
Patients usually follow recommendations?	1421 (41.7%)	1835 (53.9%)	150 (4.4%)

*Question in full: 'Do you feel that patients should renew their toothbrushes more often?'; 'Do you usually recommend to your patients when they should renew their toothbrushes?'; 'Do you think patients usually follow your recommendations about renewing toothbrushes?'.
†N/R = nil response.

patient should renew his/her toothbrush might be based on the dentist's personal habits. One possible reason for this could be the lack of published data on which to base an informed opinion. The only investigation which has evaluated the effect of toothbrush renewal intervals on the efficiency of plaque control found that subjects who renewed toothbrushes every two weeks exhibited better plaque control than those who used the same brush for the 10-week period of the study.⁷ To date, no studies have been published which show two-three months to be the optimal renewal period for a toothbrush.

Most respondents did not recommend to their patients when toothbrushes should be renewed despite the majority feeling that patients should renew toothbrushes more often. This failure to provide recommendations may be the result of a pessimistic view of patient compliance, since the majority of respondents were of the opinion that patients did not follow recommendations. This pessimistic view of patient compliance is in keeping with previous reports that patients fail to comply with dentists' recommendations⁸ and that they are poorly motivated in following instructions concerning oral hygiene.⁹⁻¹¹

Bending and splaying of bristles was selected as the main indicator that a toothbrush should be renewed and confirms the findings of previous surveys of dentists^{3,12} and patients.¹³⁻¹⁵ Although one investigation reported the amount of toothbrush wear correlated with the length of time in use,¹⁶ other studies found toothbrush wear varies among people and depends mainly on how the toothbrush is used.^{13,15,17} Those who brush with high force wear out their brushes earlier than those who brush with light force.¹⁸ The effect of toothbrush wear on the efficiency of home-based plaque control has received little attention in the literature. Of the two studies reported, one found oral hygiene deteriorated as toothbrushes became worn⁷ while a more recent investigation observed progressive wear did not impede plaque control.¹⁹

Conclusion

The results of this study suggest that dentists' views concerning toothbrush renewal for patients may well reflect their own toothbrush renewal habits and highlights the need for further studies on the effects of toothbrush wear and renewal intervals on self-performed plaque control. Such investigations are necessary if dentists are to base toothbrush renewal advice on scientifically validated data. The study also concludes that dentists think patients comply poorly with their recommendations on toothbrush renewal.

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References

1. Echeverria J, Manau G, Guerro A. Supportive care after active periodontal treatment: a review. *J Clin Periodontol* 1996;23: 898-905.
2. Axelsson, P. Mechanical plaque control. In: Lang N, Karring T, eds. *Proceedings of the 1st European Workshop on Periodontology*. London: Quintessence, 1994:219-243.
3. Abraham N, Cirincione U, Glass R. Dentists' and dental hygienists' attitudes toward toothbrush replacement and maintenance. *Clin Prev Dent* 1990;12:28-33.
4. Daly C, Marshall R. Attitudes to toothbrush renewal: A survey of Australian periodontists and dental hygienists. *Periodontol* 1996;17:118-121.
5. Sheiham A. Guidelines for health education to control dental plaque. In: Keiser JB, ed. *Periodontics: A Practical Approach*. London: Wright, 1990:46-51.
6. SAS/STAT. *Guide for personal computers*. Version 6. Cary: SAS Institute Inc, 1991.
7. Glaze P, Wade B. Toothbrush age and wear as it relates to plaque control. *J Clin Periodontol* 1986;13:52-56.
8. Wilson T. Compliance. A review of the literature with possible applications to periodontics. *J Periodontol* 1987;58:706-714.
9. Weinstein P, Milgrom P, Ratener P, et al. Dentists' perceptions of their patients: Relation to quality of care. *Public Health Dent* 1978;38:10-21.
10. Ingersoll T, Ingersoll B, Seime R, McCutcheon W. A survey of patient and auxiliary problems as they relate to behavioral dentistry curricula. *J Dent Ed* 1978;42:260-263.
11. Corah N, O'Shea R, Skeels D. Dentists' perceptions of problem behaviors in patients. *J Am Dent Assoc* 1982;104:829-833.
12. Kreifeldt J, Hill P, Calisti L. A systematic study of the plaque removing capacity of worn toothbrushes. *J Dent Res* 1980;59:2047-2055.
13. McKendrick A, McHugh W, Barbenel L. Toothbrush age and wear. An analysis. *Br Dent J* 1971;130:66-68.
14. Dean D. Toothbrushes with graduated wear: Correlation with *in vitro* cleansing performance. *Clin Prev Dent* 1991;13:25-30.
15. Dean D, Beeson L, Cannon D, Plunkett C. Condition of toothbrushes in use: Correlation with behavioral and socio-economic factors. *Clin Prev Dent* 1992;14:14-18.
16. Bergstrom J. Wear and hygiene status of toothbrushes in relation to some social background factors. *Swedish Dent J* 1973;66: 383-390.
17. Rawls H, Mkwai-Tulloch R, Casella R, Cosgrove R. The measurement of toothbrush wear. *J Dent Res* 1989;68:1781-1785.
18. Pugh B. Toothbrush wear, brushing forces and cleaning performances. *J Soc Cosmetic Chem* 1978;29:423-431.
19. Daly C, Chapple C, Cameron A. Effect of toothbrush wear on plaque control. *J Clin Periodontol* 1995;23:45-49.

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