Gerodontology

Review article

A review of the effectiveness of oral health promotion activities among elderly people

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A review of the effectiveness of oral health promotion activities among elderly people

Objectives: This study aimed to review the effectiveness of oral health promotion studies conducted among elderly people between 1997 and 2007.
Methods: Four electronic databases were searched and papers were rated for level of evidence and scientific quality. Key findings of the papers were summarised.
Results: Thirteen thousand nine hundred and four papers were retrieved and 17 studies (18 papers) met the criteria for the review: 13 were randomised controlled studies, three were quasi-experimental studies and one was a pre-/post-single group intervention study. According to the Levels of Evidence, 11 studies could be categorised as 1b and six studies could be categorised as 2b. The quality of the evidence of the 17 studies ranged from 12 to 19; 13 of the studies had a score of 15 or above; four of the studies ranged from 12 to 14. Evidence from oral health promotion activities aimed at preventing caries, improving periodontal health and altering oral health behaviours were reviewed. The use of fluoride, antimicrobial agents and health-care provider education has important roles within oral health promotion activities for elderly people. Studies have tended to be of short-term duration and rely on surrogate outcome measures of oral health.
Conclusion: In the last 10 years, increasing attention has been paid to oral health promotion activities among the elderly population and high quality evidence has emerged. However, there is a need for even higher-quality research to provide more definitive guidelines on oral health promotion practices for elderly people.

Keywords: oral health promotion, oral health education, oral disease prevention, elderly people.

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Introduction

Ageing is usually regarded as a series of progressive and irreversible biological changes, which typically result in reduced physical and cognitive ability, and the extent to which impairment is experienced is influenced by behavioural and socio-economic factors[1]. Ageing can be classified according to biological or chronological criteria; however, there is no agreed consensus as to what constitutes 'old age', although an age of '60 or older' is frequently used to delineate elderly populations[2,3].

Oral diseases are largely behavioural in origin and notionally preventable and thus appropriate oral health promotion activities are fundamental to any health strategies aimed at safeguarding oral health[4]. Health promotion is the process of enabling people to increase control over and improve their health through education, prevention and health protection[5,6]. This is of particular importance among the developing countries where economic resources are scarce and where the largest growth in the world's elderly population is taking place[7]. As populations age, a major challenge of the future will be to translate existing knowledge and sound experiences of disease prevention and health promotion into appropriate programmes[5].

It is acknowledged that elderly people have somewhat different oral health needs and thus face different oral health promotion challenges[8]. A previous review of oral health promotion between 1986 and 1996 identified only one paper that was

considered to have an acceptable level evidence for oral health promotion among elderly people[9,10]. With acknowledgement of the burden oral health places on elderly people's lives, there has been a rapid expansion in the literature on how to attain good oral health for elderly people. This study aimed to review the effectiveness of oral health promotion activities among elderly people over the past decade, 1997–2007.

Methods

The broad scope of the term 'oral health promotion' makes it difficult to define the precise methods and outcomes for the activity[9,11]. In this review, interpretation of the outcomes from oral health promotion included clinical outcomes as well as the effects on oral health knowledge, oral health attitudes and behaviour (observed and self-reported).

Four electronic databases (*PubMed, Medline, Web of Science and Cochrane library*) were searched using key words in the following way: '(elderly OR elders OR elderly people OR aged) AND (dental OR dentistry) AND (dental health education OR health promotion OR oral health OR dental hygiene OR preventive dentistry OR mouth diseases OR tooth injuries OR gum shields OR oral cancer OR toothpaste, mouthrinse OR floss OR varnish OR antimicrobial agent OR atraumatic restorative treatment OR plaque control OR behaviour training)[9,11]. Papers were selected if the combination of words appeared anywhere in the paper, were published over the 10-year period, 1997–2007, and were written in English. Multiple published reports from the same study contributed only once to the review. The reference list of each retrieved paper was reviewed and any journal appearing in the reference list was added to a list of journals to be manually searched. The outcome measure upon which the review rested was 'oral health promotion'.

The studies resulting from this search were subject to a preliminary review to identify 'effective papers'; the following types of papers were excluded: reviews, case reports, editorials, studies describing interventions which were not oral health promotion, oral health promotion directed towards smoking cessation, bacteria studies, studies reporting similar results from an intervention described in another paper by the same study and those in which quantitative data on outcomes were not presented.

For each outcome measure, the findings were grouped according to the particular outcome measured, such as *dental caries, plaque, gingival health and oral hygiene* and *knowledge, attitude and behaviour*. Details regarding the target population and settings were obtained and summarised.

Table 1 Oxford Centre for Evidence-based Medicine Levels of Evidence (May 2001).

Level	*Therapy/prevention, aetiology/harm*
1a	SR (with homogeneity) of RCTs
1b	Individual RCT (with narrow confidence interval)
1c	All or none
2a	SR (with homogeneity) of cohort studies
2b	Individual cohort study (including low-quality RCT; e.g. <80% follow-up)
2c	'Outcomes' research; ecological studies
3a	SR (with homogeneity) of case–control studies
3b	Individual case–control study
4	Case-series (and poor quality cohort and case–control studies)

RCT, randomised-controlled trial.
Available from http://www.cebm.net/

Effective studies were then classified according to the Oxford Centre for Evidence-based Medicine (Table 1)[12,13]. Each study was then scored for quality using the 21-item criteria[9] to provide a numerical quantification and ranking of the evidence (Table 2). The quality score was ascertained by calculating the number of affirmative answers to the 21-item rating. A score of 21 indicates the highest quality of evidence and a score of 0 the weakest quality of evidence.

Results

Altogether, 13 904 papers were retrieved in the primary search from four databases (Fig. 1). Of the 9398 papers retrieved after a preliminary search of *PubMed*, 405 papers were reviews, 1480 were case reports, 40 were editorials and 7462 articles were not concerned primarily with oral health promotion and/or did not present quantitative outcomes. Altogether, 11 papers were identified as effective. From the *Medline* search, 2435 papers were retrieved; 2425 papers were discarded using the exclusion criteria and eight papers were similar to papers retrieved from the previous database. This resulted in an additional two papers being added to the list of effective papers. Using the *ISI web of science*, 816 papers were retrieved after the preliminary search; this included 20 reviews, two editorials, three meeting abstracts and 791 papers. Of these papers, 784 were not concerned primarily with oral health promotion and/or did not present

Table 2 The quality of the studies those were included in the review.

Studies *Quality items*	*Wyatt*[14]	*Fure*[15]	*Mojon*[16]	*Brailsford*[17]	*Powell*[18]	*Honkala*[19]	*Persson*[20]	*Budtz-Jørgensen*[21]	*Simons*[22,23]	*Clavero*[24]	*MacEntee*[25]	*Clavero*[26]	*Peltola*[27]	*Verma*[28]	*Whitmyer*[29]	*Lowe*[30]	*Wardh*[31]
Was the research goal clearly defined?	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Was the intervention fully described for the intervention group?	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Was the intervention fully described for the control group?	√	√	√	√	√	√	√	√	√	√	√	√	√	×	×	√	√
Was the study population clearly defined?	√	×	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Was it stated how subjects were attained?	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Were the subjects clearly defined?	√	√	√	√	√	√	√	√	√	√	×	√	√	√	√	√	×
Was the method of allocation, or similarity between groups described?	√	√	√	√	√	√	√	√	√	√	√	√	√	×	×	√	√
Were groups compared on any variables?	√	√	√	√	√	×	√	√	√	√	√	√	√	√	√	√	√
Were the outcome measures clearly defined?	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Were the outcome measures objective?	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Were the outcome measures tested for validity?	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Were the outcome measures tested for reliability?	√	×	×	×	×	×	×	×	×	√	×	×	×	×	×	×	×
Were the outcome assessors blinded?	√	√	×	√	×	×	√	×	√	√	√	√	×	×	×	√	√
Was the participants blinded?	√	×	×	√	×	×	×	×	√	√	√	√	√	×	×	√	×
Was the statistical analysis appropriate?	√	√	√	√	√	×	√	√	√	√	√	√	√	√	√	√	√
Was the sample size for each group given?	√	√	√	√	√	√	×	√	√	√	√	√	√	√	√	√	√
Was there a sample size justification?	√	×	×	×	√	×	×	×	×	×	×	×	×	×	×	√	×
Was the statistical significance defined?	×	√	√	√	√	×	√	√	√	√	√	√	×	√	√	√	√
Was drop-out rate given?	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Was drop-out rate <10%?	√	√	√	×	√	×	√	×	√	×	√	×	×	√	√	×	×
Were drop-outs accounted for?	√	√	√	×	×	√	√	√	√	×	×	√	√	√	√	√	×
Quality score	19	16	16	16	16	12	16	15	18	17	16	17	15	14	14	18	14

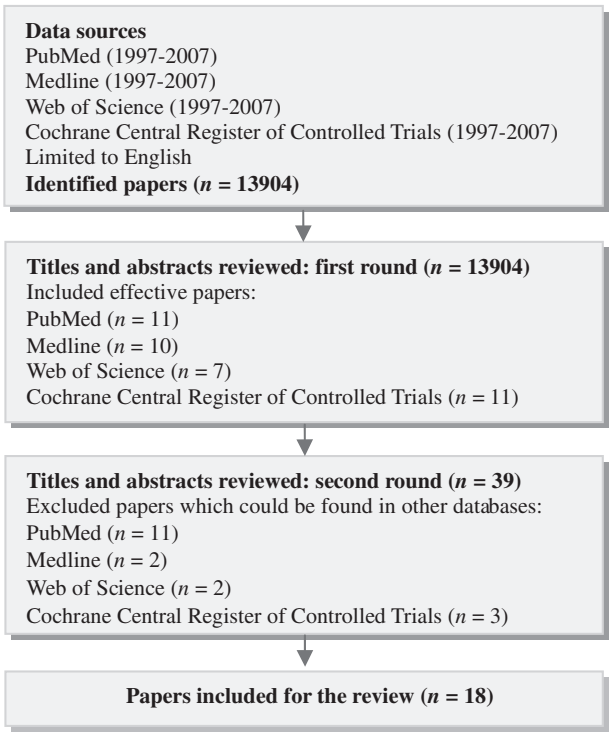

Figure 1 Diagram of literature search.

quantitative data of outcomes and five articles were similar to those obtained from previous databases. An additional two papers (including one paper from the same study in *PubMed*) were added to the list of effective papers. In the *Cochrane library*, 1255 papers were retrieved; among these, 1244 were discarded using the exclusion criteria. Eight papers were similar to papers retrieved from the previous databases, and therefore only three papers were added to the list. In total, 18 papers (17 studies) were confirmed as 'effective' for this review.

Among the 17 studies, 13 were randomised controlled studies, three were quasi-experimental studies, and one was a pre-/post-single group intervention study. Eleven studies could be categorised as having 1b level of evidence [randomised controlled trials (RCT) with narrow confidence intervals], and six studies could be categorised as having 2b level of evidence (four cohort studies and two low-quality RCT). The quality of the evidence of the 17 studies papers ranged from 12 to 19, and 13 of the papers had a score of 15 or greater (Table 2).

Studies were conducted in nursing homes (seven studies), in the clinic setting (six studies) and in the community (four studies). The sample size of the target study populations varied considerably from 12 to 1101. The follow-up period for the majority of the studies was <2 years.

Dental caries

Incidence of dental caries was an outcome of six studies (Table 3). Four of the studies were level 1b evidence and two studies were level 2b. The quality of the studies ranged from 12 to 19. In a RCT of 5-year duration[14], 1101 elderly people made up of two groups, one using a 0.12% chlorhexidine (CHX) mouthrinse and another a placebo mouthrinse. No significant difference in the caries increment was observed. In an RCT of 2-year duration[15], subjects who rinsed twice a day with a 0.05% NaF solution and brushed their teeth with a 0.32% NaF toothpaste had a lower incidence of caries than those who brushed their teeth using the toothpaste alone. In an RCT of 18-month duration[16], a lower prevalence of secondary coronal caries and root caries was observed among subjects who received a comprehensive oral health programme (including oral health promotion activities) compared to the control group (who only received dental treatment on request). In another RCT of 1-year duration[17], it was observed that the size of root caries lesions enlarged among those who had a fluoride containing varnish (Fluor-protector, Ivoclar-VivaDent, Principality of Liechtenstein) but no antimicrobial agent applied to root surfaces whereas there was no significant change in the size of root caries lesions where Fluor-protector plus a CHX-containing varnish (Cervitec, Ivoclar-VivaDent, Principality of Liechtenstein) was applied at baseline. A further RCT of 3-year duration[18], among community-dwelling elders showed no significant reduction in coronal or root caries among those who received preventive treatments (of varying degrees) compared with a control group receiving care in the usual way from a dental practitioner. Atraumatic dental restorations proved feasible and acceptable in the treatment of dental caries in a 1-year cohort study[19].

Plaque, gingival health and oral hygiene

Nine studies (10 effective papers) were related to plaque, gingival health and oral hygiene (Table 4). Among them, six studies were categorised of being at the 1b level of evidence and three as being at level 2b. The studies ranged in quality from scores of 14 to 18, with two-thirds having a score of 15 or above. In an RCT of 3-year duration[20] among community-dwelling elders who received varying degrees of a bio-behavioural preventive programme, those who received intra-oral prevention

Table 3 Oral health promotion – caries.

Authors	*Research type*	*Target population*	*Setting*	*Intervention*	*Results given*	*Follow-up*	*Level of evidence*	*Quality of evidence*
Wyatt *et al.* [14]	RCT	Age: 60–75 years Expt 551 Control 550	Clinic	Experimental group: 0.12% CHX solution rinsing daily for 1 month, followed by weekly rinsing for 5 months; Control group: placebo (quinidine, alcohol solution) rinsing daily for 1 month, followed by weekly rinsing for 5 months.	No DMFS difference ($p > 0.05$)	5 years	1b	19
Fure *et al.* [15]	RCT	Age: ≥60 years Rinsing group 49 Tablet group 51 Slurry group 32 Control group 32	Clinic	Rinsing group: rinse twice a day with a 0.05% NaF solution; brush twice a day by a fluoride toothpaste (containing 0.32% NaF); Tablet group: suck twice a day on a 1.66 mg NaF tablet; brush twice a day by a fluoride toothpaste (containing0.32%NaF); Slurry group: brush teeth three times a day using a toothpaste slurry rinsing technique; brush twice a day by a fluoride toothpaste (containing 0.32% NaF); Control group: brush twice a day by a fluoride toothpaste (containing 0.32% NaF);	DFS increment was lower in rinsing group than in control group ($p < 0.002$); lower DFS in the rinsing group compared to the control group among buccal ($p < 0.003$) and proximal ($p < 0.004$) surfaces; lower DFS in the tablet group than in the slurry group for the lingual surfaces ($p < 0.002$).	2 years	1b	16

Table 3 (Continued)

Authors	*Research type*	*Target population*	*Setting*	*Intervention*	*Results given*	*Follow-up*	*Level of evidence*	*Quality of evidence*
Mojon *et al.* [16]	RCT	Age: ≥65 years Expt 58 Control 58	Nursing home	Experimental group: health-care provider education, prophylactic treatment, oral hygiene instruction, free toothbrush and fluoride tooth paste; Control group: no oral health promotion provided.	Secondary caries (%) increased in control group ($p < 0.001$); root caries (%) decreased in the experimental group ($p = 0.001$)	18 months	1b	16
Brailsford *et al.* [17]	RCT	Age: ≥65 yr Expt 52 Control 50	Clinic	Experimental group: fluoride varnish (Fluor-Protector, Ivoclar-VivaDent) plus an antimicrobial varnish (Cervitec, Ivoclar-VivaDent); Control group: fluoride varnish (Fluor-Protector, Ivoclar-VivaDent) plus a varnish without antimicrobial ingredients.	Severity of root caries in the control group became worse ($p < 0.05$)	1 year	1b	16
Powell *et al.* [18]	RCT	Age: 60–99 years Group 1 55 Group 2 48 Group 3 52 Group 4 52 Group 5 55	Community	Group 1: usual oral care; Group 2: educational seminar; Group 3: education seminar + 0.12% CHX rinse; Group 4: education seminar + CHX rinse + fluoride varnish; Group 5: education seminar + CHX rinse + fluoride varnish + scaling and root planning.	No significant reduction of coronal caries or root caries observed between groups ($p > 0.05$)	3 years	2b	16
Honkala & Honkala[19]	Quasi-experiment study	Age: ≥60 years Expt 21 Control 56	Community	Experimental group: ART and filling; Control group: depuration.	68% fillings were good.	1 year	2b	12

RCT, randomised-controlled trial; CHX, chlorhexidine.

Table 4 Oral health promotion – plaque, gingival health and oral hygiene.

Study	*Research type*	*Target population*	*Setting*	*Intervention*	*Results given*	*Follow-up*	*Level of evidence*	*Quality of evidence*
Persson *et al.* [20]	RCT	Age: 60–90 years Total 297 5 groups N/S	Clinic	Group 1: none; Group 2: behavioural training; Group 3: behavioural training + weekly CHX rinse; Group 4: behavioural training + weekly CHX rinse + semi-annual fluoride varnish; Group 5: behavioural training + weekly CHX rinse + semi-annual fluoride varnish + semi-annual prophylaxis.	Differences in tooth loss and CPITN scores were apparent among the groups ($p < 0.05$); differences in GI, PD and CAL were only apparent at 1-year follow-up.	3 years	1b	16
Budtz-Jørgensen *et al.* [21]	RCT	Age: ≥75 years Expt 122 Control 115	Nursing home	Experimental group: scaling at the beginning; free toothbrushes and fluoride toothpaste; oral health education once; Control group: no oral health promotion provided.	The severity of denture stomatitis decreased ($p = 0.005$); the prevalence of glossitis decreased ($p = 0.005$).	18 months	1b	15
Simons *et al.* [22,23]	RCT	Age: ≥60 years ACHX group 43 *X* group 37 *n* group 31	Nursing home	2 pellets ACHX/xylitol gums, xylitol gums or no gum, twice daily for 12 months	PI, GI decreased in ACHX group ($p < 0.001$) PI decreased in X group and N group ($p < 0.05$) PI, GI decreased more in ACHX group than the other groups ($p < 0.05$) ACHX group had less denture stomatitis and angular cheilitis ($p < 0.1$) Denture debris improved in ACHX and *X* group but not in *n* group. ($p < 0.01$)	1 year	1b	18

Table 4 (Continued)

Study	*Research type*	*Target population*	*Setting*	*Intervention*	*Results given*	*Follow-up*	*Level of evidence*	*Quality of evidence*
Clavero *et al.* [24]	RCT	Age: ≥64 years Expt 27 Control 29	Nursing home	Experimental group: Cervitec varnish was applied twice in the first week of the study and reapplied at 1, 3 and 6 months; Control group: placebo varnish (without antimicrobial ingredient) was applied twice in the first week of the study and reapplied at 1, 3 and 6 months.	No significant difference in PI and scores between the groups ($p > 0.05$).	6 months	1b	17
MacEntee *et al.* [25]	RCT	Elderly Expt 76 Control 90	Nursing home	Active group: 1-h seminar with care-aides with additional information Once Control group: a seminar only	No significant different in the clinic results ($p > 0.05$).	3 months	1b	16
Clavero *et al.* [26]	RCT	Age: ≥65 years $n = 16$ Expt N/S Control N/S	Clinic	One group received one daily of 0.2% CHX + another daily placebo. The other group received two-daily applications of 0.2% CHX spray. After a 30-day washout period, the groups were interchanged.	A significant reduction in PI and GI was produced in both the groups ($p < 0.05$).	1 month	1b	17
Peltola *et al.* [27]	RCT	Age: ≥60 years Group A 72 Group B 67 Control 66	Nursing home	Group A: oral hygiene measure 1/3 weeks; Group B: hands-on instructions; Control group: no oral health promotion provided.	Hands-on instructions improved the denture hygiene and dental hygiene significantly ($p < 0.05$).	11 months	2b	15
Verma & Bhat[28]	Quai-experiment study	Age: 68–85 years $n = 14$ Self-control	Community	Manual toothbrushes brushed teeth twice a day for 3 months, following by powered toothbrushes for 3 months.	PI, GI scores decreased significantly by using powered toothbrushes comparing to manual toothbrushes ($p < 0.05$)	3 months	2b	14
Whitmyer *et al.* [29]	Pre-/post-single group interventions	Age: 69–78 years $n = 12$	Community	Ultrasonic toothbrush for precisely 3 min/day in a month.	PI, Bleeding Index decreased ($p < 0.001$)	1 month	2b	14

RCT, randomised-controlled trial; CHX, chlorhexidine; ACHX, chlorhexidine acetate; N/S, not stated; GI, gingival index; PI, plaque index.

Table 5 Oral health promotion – Knowledge, attitude and behaviour.

Study	*Research type*	*Target population*	*Setting*	*Intervention*	*Results given*	*Follow-up*	*Level of evidence*	*Quality of evidence*
Lowe *et al.* [30]	RCT	Age: ≥75 years Expt 183 Control 180	Clinic	Experimental group: oral health visit once; Control group: no oral health visit.	Dental attendance increased among the experimental group ($p < 0.0001$)	6 months	1b	18
Wardh *et al.* [31]	Quai-experimental study	Elderly Control 48 Expt 48	Nursing home	Experimental group: specially trained oral care aids from the nursing staff; Control group: usual oral care.	More individuals in the intervention group established dental contacts. ($p < 0.05$)	18 months	2b	14

RCT, randomised controlled trial.

experienced less tooth loss. However, differences in gingival inflammation, probing depth and clinical attachment among the groups were only apparent at the 1-year follow-up. At the 3-year follow-up, those who received the greatest degree of intervention experienced greater improvement in CPITN scores compared to the control group. In an RCT of 18-month duration[21] all patients in the experimental group who received prophylactic treatment, such as scaling, followed by oral health education had a lower prevalence of palatal inflammation and glossitis compared to the control group (scaling only if requested). A 1-year RCT study[22,23] compared the oral health preventive effects of chewing CHX acetate/xylitol gum (ACHX group), xylitol gum and no gum. The ACHX group had significantly lower plaque index (PI) and gingival index (GI) scores than the xylitol gum and no gum groups at 12 months. The xylitol gum group had significantly lower PI and GI scores than the no gum group at 12 months. The prevalence of denture stomatitis and angular cheilitis was lower among the ACHX and xylitol gum groups compared to the no gum group. In a 6-month RCT[24] CHX-thymol varnish (Cervitec) did not prove effective in reducing GI or PI scores. Changes were not observed in GI scores following oral health education to residents at an elderly centre[25]. A 1-month cross-over RCT study[26] using 0.2% CHX spray concluded that a single daily application of the spray was as effective in reducing plaque and gingival inflammation as two daily applications. Oral hygiene interventions in a long-term hospital-setting for elderly people reported improvements in denture and dental hygiene when nursing staff received hands-on instruction and assumed responsibility for subjects' daily oral hygiene compared to the provision of oral hygiene measures every 3 weeks from hygienists[27]. A cross-over clinical trial on the effectiveness of powered toothbrushes[28] demonstrated that they were more effective in removing plaque and controlling gingivitis than manual tooth brushing over a 3-month period. In a pre-/post-single group intervention study of 30-day duration[29], the use of an ultrasonic toothbrush resulted in a significant reduction in PI and GI scores.

Knowledge, attitude and behaviour

Two studies provided results about changes in knowledge, attitude and behaviour (Table 5), one study being at level 1b evidence and the others at level 2b. The scores of the quality of the studies were 14 and 18 respectively. Invitation for an oral

health referral among elders attending a preventive general health check significantly increased dental attendance compared with not offering the invitation[30]. In an 18-month clinical trial at a nursing home[31] there was an observed change in attitude towards accessing dental care and in establishing dental contacts among subjects who were given a support system with specially trained oral care aides from the nursing staff compared to the control group where only basic oral health education was provided.

Discussion

In the decade 1997–2007, increasing attention has been paid to oral health promotion activities among the elderly population as ascertained from our review of published results in the various electronic databases. The four databases yielded different numbers of research papers relating to oral health promotion among elderly people. This illustrates the importance of conducting searches across several databases so as to derive a comprehensive set of papers to consider in a review[32]. However, for the most part, the papers have been editorials, non-systematic reviews and studies describing interventions which were not primarily concerned with the outcomes of oral health promotion. Compared to a decade ago, a greater number of papers with a higher level of scientific evidence using the Oxford Centre for Evidence-based Medicine criteria have been published to guide oral health promotion activities among elderly people. Among these, the quality of the evidence varied somewhat according to Kay and Locker's criteria[9,10]. However, all studies had a clearly defined research goal and at least one clearly defined outcome measure. Evidence of the reliability and validity of outcome was often unclear or not stated and the process of blinding assessors and participants was ambiguous. Although clearly practice and policy should be guided from the best available evidence, it should be acknowledged that evidence-based medicine has its limitations, particularly with respect to health promotion activities, which frequently are not amenable to testing in a rigorous clinical research manner[33,34].

Elderly people are a caries risk group (particularly for root caries) and approximately one-third of the effective papers that emerged in the past decade related to the prevention of coronal and/or root caries. Moreover, the majority of these papers were from studies, which could be categorised as being of the highest level of evidence (level 1b). Furthermore, the quality of these studies was high with all studies scoring 15 or above according to Kay and Locker's criteria. The use of fluoride, antimicrobial agents and health-care provide educational interventions all appear to have a role in preventing coronal and/or root caries[15–17]. The atraumatic dental restorative procedure is a feasible option in the management of caries among elderly people but its efficacy requires further investigation.

Evaluation of periodontal outcomes from oral health promotion activities has tended to rely on surrogate or proxy assessment of periodontal health, namely levels of dental plaque or oral hygiene[35]. This in part relates to the short duration of follow-up studies (most of them for <1 year). The majority of the effective papers related to oral health promotion activities aimed at improving plaque levels, gingival health and oral hygiene. The use of powered toothbrushes, antimicrobial agents and comprehensive oral health promotion regimes are likely to benefit periodontal health. However, whether oral health promotion can improve and sustain periodontal status requires investigation through further high quality studies. Definite periodontal outcome measures, such as pocket depth and clinical attachment levels, need to be included as outcome measures.

Few studies have focussed on changes in oral health knowledge, attitude or behaviour as a result of oral health promotion activities. Whilst it is accepted that assessment of knowledge and attitudes is somewhat complex, there is a need to establish standardised assessment measures to facilitate evaluation of oral health promotion activities[36]. It does appear that allied health-care personal have a role in improving oral health behaviour including dental attendance and studies support the notion of multi-sector involvement within health promotion[30]. However, there is a need for studies of longer duration to determine whether changes in oral health behaviour are merely transient or are actually sustained following these interventions.

In conclusion, increasing attention has been paid to oral health promotion activities among elderly people. A number of studies with a high level of scientific evidence and quality have become available to guide oral health promotion practices. As ever, even higher quality studies are required of adequate duration to determine the effects of these activities on dental caries and periodontal status. Furthermore there is a need to standardise assessments of oral health knowledge, attitudes and behaviour.

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