

An appraisal of Brushing for Life

Background

Brushing for Life is a government initiative to reduce the inequalities in children's oral health. It arose from the policy document Modernising NHS Dentistry¹ and aimed to improve the oral health of children in the most disadvantaged areas of the country. The scheme started in 2001, targeting initially the 21 health authorities with the highest levels of tooth decay in young children. It was subsequently extended to the next nine worst authorities and then offered nationally to Sure Start schemes² in areas not already benefiting from fluoridation of the water supplies. Sure Start is intended to address child poverty and social exclusion and uses strategies purportedly based on 'firm evidence of what works'.

Nuts and bolts of Brushing for Life

A health visitor led programme, Brushing for Life is designed to promote regular brushing of children's teeth using toothpaste with a middle range (1,000 ppm) of fluoride content. Where appropriate, packs containing toothpaste, a toothbrush and a health educational leaflet are distributed to the parents of infants at their 8, 18 and 36 month development checks. This is supported by advice from the health visitor on the care of the child's teeth. The aim is to encourage the formation of an early toothbrushing habit. The programme was time-limited and envisaged to run with central funding for three years. At this point, the responsibility for financing the scheme would devolve to primary care trusts (PCTs) through their mainstream funding, eg Community Dental Service (CDS)

health promotion budgets, Sure Start resources or local community grants. By July 2005 approximately 1.5 million packs had been issued.

Objective of the appraisal

The purpose of this appraisal was a) to look at the views and experiences of deliverers of the programme - primarily health visitors and oral health promotion coordinators within PCTs – using information gained from questionnaires; b) to record some surrogate measures of outcome namely, the response of parents and the toothbrushing behaviour of children involved, again from questionnaire data; c) to consider possible benefits of the scheme, in terms of clinical outcomes, from an examination of published evidence; d) to discuss Brushing for Life as a national strategy for improving the dental health of children and to consider its likely cost-effectiveness compared with alternative approaches - notably water fluoridation; and e) to make recommendations and consider what further evaluation would be desirable. The document is intended to inform consultants in dental public health, directors of public health, clinical directors and other interested individuals.

Views and experiences of providers

During the introductory phase an evaluation was conducted to ascertain the experiences of health visitors with the scheme, and their attitudes towards it. Five hundred and forty-nine of 747 health visitors contacted (73%) responded to a questionnaire. Eighty-six percent considered that they had received sufficient information about the scheme and 62% had attended local briefing sessions. Additional information that health visitors believed would be helpful included

how to choose toothpastes, and lists of local dentists. Only 2% did not find it easy to order stocks of brushing packs but 22% had experienced some difficulty in storing them. The programme was said to be well received by parents and all respondents wanted the scheme to continue. Seventy-nine percent could not suggest any way in which it could be improved. Of the remainder, the two most common suggestions concerned amendments or additions to the leaflet and improved arrangements for storage. One of the concerns expressed by a small number of respondents was the conflicting advice from some local dentists.

In addition to this, the logistics of disseminating the programme in terms of training, operational procedures and general provider satisfaction were separately assessed. Whilst the cooperation of health visitors was viewed as essential, facilitation of the scheme by Community Dental Service (CDS) oral health promoters was pivotal. The latter had provided a conduit between the regional coordinators, health visitors and Sure Start staff. Although regional and local differences existed, generally the oral health promoters had facilitated the training of health visitors and other staff, provided information on location and requisition points for NHS deliveries, and formed networks with Sure Start programmes which sometimes had not existed before.

Parents' response and children's toothbrushing behaviour

An evaluation of the impact of Brushing for Life on the behaviour of parents and toothbrushing practices of their children was conducted in Barnsley, an urban industrial area with a relatively static population enabling the scheme to have a reasonable chance of being followed through in children from 8 months to 3

years. In 2002 Barnsley had an exceptionally high level of tooth decay in slightly older (5-year-old) children. The mean dmft (decayed, missing and filled primary teeth) index – the standard measure of the prevalence and severity of dental decay in young children – was 2.44 in 2001/2002 compared with an average for the same age group in England overall of 1.47 ³. The project amounted to a three-year ‘demonstration study’ since no control group was involved. It was based on a self-completion questionnaire. The sample cohort was identifiable, enabling the participating parents and children to be followed up at each stage.

One thousand and one children were originally enrolled at the age of eight months. At age 18 months, 769 remained in the study for follow up and at 36 months, 270 remained – approximately 27% of the original cohort. At 8 months it was reported that 70% of the children were not yet brushing their teeth or having them brushed. However, by 18 months the teeth were reportedly being brushed in 95% of children, with the figure rising to 100% at 36 months. This compares with a national figure of 96% for slightly older children (4-6 years) reported in the 2000 national diet and nutrition survey ⁴. A high proportion of parents stated that they would brush their children’s teeth when they emerged but paradoxically most of these children would already have had erupted teeth at the time. The proportion of children whose teeth were being brushed at least once a day increased with age as did the proportion who were said to brush their own teeth (12% at 8 months; 39% at 18 months; 55% at 36 months). At 8 months 46%, at 18 months 59%, and at 36 months 64% of the Barnsley parents claimed their children’s teeth were receiving a brushing more than once a day.

Nationally, 68% of parents claimed the teeth of their 4-6-year-old children were brushed twice a day or more although this fell to 53% where the mother had no secondary or higher educational qualifications. In the Barnsley cohort, 79% of the 8-month-old children were stated to always receive help with their brushing. Nationally, 36% of older children (4-6 years) have been reported as receiving parental help ⁴. As regards the size of toothbrush used, not unexpectedly this also varied according to the children's ages. Among those children whose teeth were brushed, parents of 20% at 8 months, 97% at 18 months and 98% at 36 months reported using toothpaste. This was on every brushing occasion for at least 95% of respondents. As to how much toothpaste was used, some 60% or more said that only a small part of the brush head was covered. Regarding advice on when to start brushing, 69% of parents said that they had received this from the health visitor when the children were 8 months of age. At 36 months advice was being obtained from a health visitor in 44% of instances and from a dentist in 15%. This contrasts with the national picture where, in 64% of instances, the source of advice was a dentist and in only 16%, a health visitor or school nurse ⁴.

The Barnsley evaluation concluded that although parents' knowledge of toothbrushing was good, they tended to start the practice rather late. It was believed that Brushing for Life had had a positive effect in influencing parents' knowledge and had fostered a commitment to oral health promotion among groups not traditionally involved in care of the teeth. However, the report failed to discuss the implications of the finding that around three quarters of the original cohort had either dropped out at 36 months, or the families were

untraceable or otherwise unable to respond to the questionnaire. A high response rate is an important process measure and also interim outcome indicator of the success of a health promotion programme.

What are the possible benefits from Brushing for Life?

There are some pointers from previous reported work towards possible benefits that might accrue from Brushing for Life in terms of behavioural change and health gain.

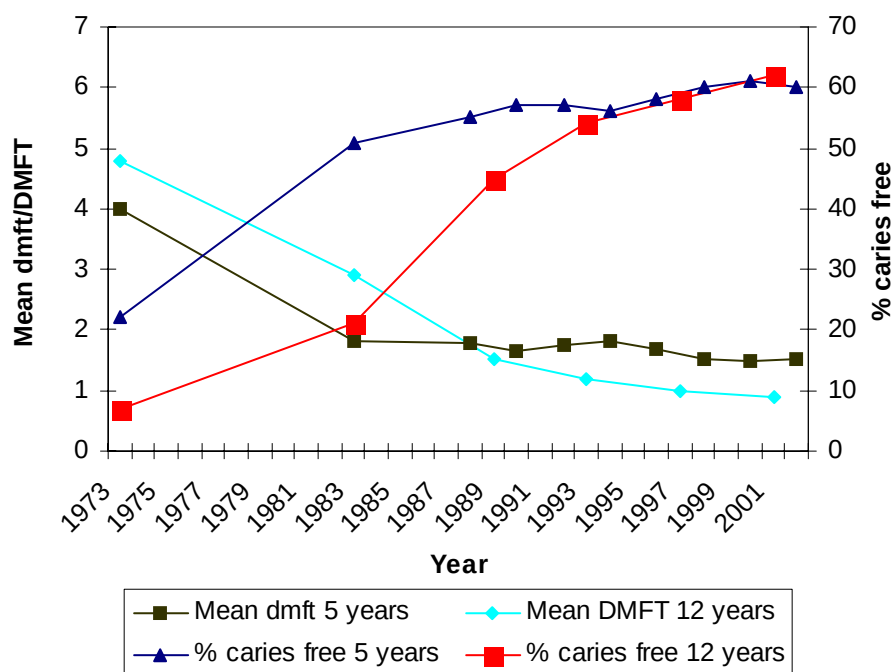
Behavioural change through health education

In a systematic review of the effectiveness of health promotion aimed at improving oral health Kay and Locker ⁵ found that few definitive conclusions could be drawn from available evidence. However, dental decay and gum (periodontal) disease could be controlled by regular toothbrushing with a fluoride dentifrice although a cost-effective method for promoting such behaviour reliably had not been established. Moreover, knowledge levels could almost always be improved by oral health promotion initiatives but whether shifts in knowledge and attitudes could be causally related to changes in behaviour or clinical indices of disease had also not been established. Despite disappointing health gain outcomes accruing from health education, a programme combining information and practical instruction with an active intervention like fluoride toothpaste brushing could well produce benefits over and above person to person health education alone.

Clinical benefits associated with fluoride toothpastes.

There is little doubt that fluoride toothpastes have played a major role in reducing tooth decay in British children since the 1970s. Figure 1 illustrates the shift in the dmft of 5-year-old, and DMFT of permanent teeth of 12-year-old children in England and Wales over 30 years, together with variations in the proportions free from decay, recorded in periodic population-based surveys ⁶. Remarkable declines in dental decay experience can be seen in both age groups. At 5 years a dmft of 4.0 in 1973 fell steeply to a figure of 1.97 in 1993 thence levelling off to around 1.7.

Figure 1. Dental decay experience of 5- and 12-year-old children in England and Wales from 1973-2002.



The steep fall in dental decay in British children after about 1973 corresponded with the rapid expansion in the marketing of fluoride toothpaste. UK consumption per head per year rose from 246ml in 1972 to 380ml in 1982, falling to 320ml in 1990 and then stabilising at ~300ml by 1995, whilst the proportion of toothpaste sold which contained fluoride had risen from 5% in 1970 to 96% by 1980 ⁶. Fluoride toothpaste's share of the market has remained close to 100% ever since ⁷. The effect of fluoride toothpastes used in the home was cited by a panel of international experts as being overwhelmingly the most important reason for the decline in dental decay in many Western countries ⁸. Moreover, caries reductions per annum demonstrated in randomised controlled trials (RCT) of fluoride dentifrices are consistent with compound annual reduction rates demonstrated in these British data ⁹.

Cost-effectiveness of fluoride toothpaste brushing

A critical aspect of caries control in the child population by health education and prevention programmes like Brushing for Life is their cost-effectiveness in comparison with alternative approaches, notably fluoridation of the water supplies. Up to a point, the efficacy of a toothpaste in preventing decay is related, other things being equal, to the strength of its fluoride content. The 2000 diet and nutrition survey questioned parents on the fluoride concentration in the toothpaste used by their young children ⁴. Thirty-nine percent said the toothpaste contained a low fluoride level (<600 ppm F⁻), 38% a medium level (600-1449 ppm F⁻) and 21% a high level (1450+ ppm F⁻). In a RCT among children aged 1–5 years, Ellwood *et al* ¹⁰ found that a low fluoride dentifrice (440 ppm F⁻) gave measurable benefit only in the most deprived quartile of trial participants

whereas a high fluoride dentifrice (1450 ppm F⁻) improved oral health in all socio-economic groups.

There is little published information on the cost and value of young children brushing their teeth with fluoride toothpastes to prevent dental decay. Davies *et al.*¹¹ evaluated a postal toothpaste programme in 5-year-old children in a deprived, non-fluoridated area in the North of England. Toothpaste containing 1450 ppm F⁻, and toothbrushes were mailed free to children from the age of 12 months to five years. Over 5,000 children completed the study. The cost-effectiveness of the programme was assessed against a 'do nothing' scenario. The dental benefits, in terms of reduced caries experience at five years (mean dmft), and comprehensive costs of delivering the programme represented the outcome measures. At five years, the intervention group had a mean dmft of 2.15 while that of the control (do nothing) group was 2.57. It was estimated that the total cost of the programme amounted to £27.93 per child while the cost of reducing their average dmft by 1 unit was calculated as £80.83. The authors noted that for a number of reasons the costs were overestimated and the benefits underestimated. Nevertheless, they believed the study provided suitable data for comparisons.

Clearly, this programme differed in several respects from Brushing for Life; among other things in the mode of delivery of the materials and the use of a toothpaste with a higher fluoride content. A theoretical risk of young children brushing with toothpaste containing a standard commercial level of fluoride (1450 ppm F⁻) is that swallowing the paste during the pre-eruption period of

tooth crown formation may lead to mottling of the enamel (dental fluorosis), a specific type of enamel opacity. In this connection Holt *et al.*¹², evaluating the results of a fluoride toothpaste RCT in children from two to five years, found that the degree of risk of fluorosis, although statistically significant, was slight from use of a toothpaste with 1,000 ppm F⁻ compared with one containing 550 ppm F⁻. On the other hand, the caries reduction was greater - though not significantly - in those children using the higher content paste. With regard to frequency of brushing, virtually no difference has been observed in the proportion of children with enamel opacities of all types between those who brush with toothpaste twice a day or more and those who brush less than twice a day⁴.

Brushing for Life in relation to water fluoridation

Brushing for Life is not intended to replace fluoridation of the public water supplies as the main national strategy for reducing dental decay in the population. Rather it should provide a measure of preventive cover for vulnerable infants in areas of the country where water fluoridation may not be cost-effective. It could also be a useful short-term help whilst fluoridation is being considered, and public consultation processes entered into, but it has not yet been implemented. Thus PCTs would be active in prevention rather than waiting for the administrative hurdles to water fluoridation to be surmounted.

Ultimately, all strategies for preventing dental decay must be evaluated against the yardstick of fluoridation. Fluoridation's established benefits in terms of reductions in the disease worldwide have been extensively documented¹³.

Comparing the two major English cities outside London, for example, in fluoridated Birmingham recent surveys showed the average dmft in 5-year-old children to be 0.98. The corresponding figure for non-fluoridated Manchester was 2.47 ¹³.

Major water fluoridation schemes covering Birmingham and Newcastle were first implemented in the early 1960s at a time when caries in British children was at its peak and virtually out of control. However, although a gradual decline started thereafter, the impact of these schemes was not as noticeable as that of the introduction of fluoride toothpaste in the 1970s ⁶; the newly established water fluoridation schemes served only around 10% of the population so that their effect nationally was probably swamped out.

In 1998 the University of York Health Economics Consortium stated '*In areas where the average number of decayed, missing or filled teeth (dmft) is 2.0 or more (and especially if there are districts where it is greater than 2.6), and where the local water treatment works serve populations of at least 200,000, the benefits of water fluoridation are likely to be significantly greater than the costs.*' ¹⁴. Such areas would include much of the North West and North East of England, parts of Yorkshire, London and some areas of the South East. Earlier the consortium had affirmed that '*in terms of cost, effect and the certainty of that effect, the most cost-effective policy is fluoridation of the water supplies.*' ¹⁵. Compared with all other caries prophylactic methods, fluoridation achieves economic 'dominance'. That is to say, it produces a greater effect at a lower cost than any other method.

Water fluoridation is a true whole population preventive strategy designed to reduce dental decay in all age groups irrespective of socio-economic status. Moreover, it gives added protection to those who regularly use fluoride toothpaste. Nevertheless, the success of fluoride toothpastes in reducing dental decay since their introduction has been substantial. Yet a major shortcoming of fluoride toothpaste brushing as a population preventive strategy is that it requires effort on the part of the user to purchase and use the oral hygiene products regularly. For some families in areas of high deprivation, toothbrushes and toothpaste are not high on their list of priorities. Brushing for Life is designed to help overcome this.

Recommendations and a road map for further evaluation

Brushing for Life shows some encouraging indications of potential benefit. However, while these are all necessary pre-conditions, they are not sufficient for judging the programme's long-term likelihood of success. Ideally it should be evaluated in a pragmatic RCT that would measure its clinical outcome in significantly reducing dental decay among children and its cost-effectiveness in controlling disease levels in comparison with other approaches, notably water fluoridation. Short of this, the costs of Brushing for Life must be carefully recorded, and its effects rigorously monitored in periodic child population surveys. In the meantime the scheme can be commended to those charged with disseminating and implementing it in appropriate locations, on the grounds that it is founded on sound principles and should be capable of making a significant impact on the oral health of disadvantaged children.

Acknowledgements

This appraisal of Brushing for Life was drawn from published work, reports and other documentation produced, among others, by the following: Dr John Beal, Professor Anthony Blinkhorn, Professor Martin Downer, Dr Caroline Drugan, Ms Polly Monday, Professor Tony Newton and Ms Diane Seymour.

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