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An oral health education programme based on the National Curriculum

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Summary. *Aim.* The aim of this study was to develop and evaluate a teaching programme based on the national curriculum for use in a primary school setting.
Design. National Curriculum guidelines were combined with oral health education messages to draw up lesson plans for teachers to deliver. A questionnaire was used to demonstrate children's oral health knowledge prior to the teaching programme, and at 1 and 7 weeks following the programme.
The study took place in inner-city, state-run primary schools in Manchester and North London, UK.
The subjects were children between the ages of 7 and 8 years from Manchester ($n = 58$) and North London ($n = 30$).
The main outcome measure was change in knowledge attributable to a newly developed teaching programme.
Results. The children in Manchester had a higher level of knowledge prior to the teaching programme. Following the teaching programme, children in both schools showed a significant improvement in dental health knowledge ($P < 0{\cdot}001$). Seven weeks later, the Manchester children showed no significant loss of knowledge ($P < 0{\cdot}001$).
Conclusions. The aims of the National Curriculum were easily integrated with oral health messages. A more widely available teaching resource, such as the one described in this study, would be useful to encourage the teaching profession to take on oral health education without more costly input from dental professionals.

Introduction

Is oral health education effective?

In recent years, attention has been drawn towards assessing the effectiveness of oral health promotion campaigns. This is in line with demand for evidence-based research and will help to inform policy makers on how to allocate resources. A number of systematic reviews have been conducted on the available evidence [1–4]. These have shown that oral health education can be effective in increasing knowledge in the short term [3], and to some extent, behaviour such as toothbrushing and healthy eating [1].

Oral health promotion within schools

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A number of studies have demonstrated that teaching in schools can be effective in terms of improving both knowledge and health outcome measures. 'Natural Nashers' was a 3-week integrated curriculum package aimed at adolescents [5]. In their literature review, Sprod *et al*. [3] concluded that this was a strong study design that proved to be an effective intervention. In another study, four, one-hour lessons in 32 primary schools improved plaque scores and knowledge about toothbrushes and disclosing tablets compared to a control group [6]. In a review of dental health education in schools [7], Flanders commented that, although knowledge does increase, to achieve behavioural changes requires much more long-term input – and not just one-off interventions. He supported the school as an environment in which to provide oral health promotion because virtually all children attend school.

Cost-effectiveness

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However, as the reviews have suggested, the cost-effectiveness of many of these programmes is questionable. It has been noted that children often receive information from and have their behaviour patterns influenced by their mothers, and that teachers may be giving information based on prevailing myths of the time [8,9]. School-based programmes often use dental professionals as educators to ensure accuracy of information. Wight and Blinkhorn [10] found the extra costs of hygienist-run programmes in a school to be too high to justify them, despite a measurable decrease in caries increment. The teacher-based group in the above study was also costly since teachers were paid for extra activities. Improvements in knowledge and reported behaviour have been reported in an randomized controlled trial of a school education programme [11]. However, the authors concluded that it is questionable whether the health gain justified the financial and personnel costs. Because of this disparity between cost and effectiveness, Kay and Locker [1] stated that 'the option of doing nothing must always be considered' with oral health promotion.

Current study

Oral health is covered in the National Curriculum as part of science in a unit called 'Teeth and Eating'. The unit highlights the importance of dental care, the functions of teeth and how to maintain a healthy diet. The aim of the National Curriculum is to provide children with knowledge to allow them to make informed choices about the way they lead their lives and maintain their health [12].

The aim of this study was to develop a cost-effective and comprehensive programme for the primary school age group based upon the National Curriculum. Whilst the study was not designed to add any more data to the evidence base of the effectiveness of oral health promotion, measurements as to the ability of the programme to influence children's knowledge were made.

Subjects and methods

The study was carried out in two inner-city state schools, one in Manchester and one in North London, UK. Pupils were all in Year 3, and aged between 7 and 8 years. In Manchester, two classes were given the teaching, one of 30 pupils and the other of 28. The London school had one class of 30 pupils. All groups received some form of intervention.

A teaching programme was developed by the authors based on what the children were expected to learn according to the National Curriculum Key Stage 2 guidelines. The authors ensured that the main oral health promotion messages [13] were covered within this – including instruction about the prevention of dental decay and erosion.

The programme was divided into three sections as follows:

1 *Teeth and their function*
- Different layers of teeth
- Different types of teeth
- Using teeth for eating
- Animals with different teeth for different purposes

This was taught using a story and poems, and the children had worksheets to fill in. They also wrote their own poems about their teeth.

2 *What can go wrong with our teeth?*
- Decay, toothache, tooth loss
- Erosion

Erosion was demonstrated using popular soft drinks and dirty copper coins. The dirt was compared to enamel, and the soft drinks which dissolved away the dirt were highlighted as being harmful to teeth. Worksheets were produced for this experiment and also about decay.

3 *How to take care of our teeth*
- Diet
- Importance of regular toothbrushing
- Toothbrushing technique
- Dental visits

The children discussed foods which contain sugars, were encouraged to read ingredients from packages and they attended a safe snacks party. A demonstration of toothbrushing was provided and the children were given disclosing tablets so that they could observe the effectiveness of their brushing.

The teaching programme was carried out over three lessons lasting 2 h each. The first part of each lesson was spent teaching and discussing the subject with the whole class, and then the children took part in activities such as writing poems, experiments and filling in worksheets. Lessons could be fitted into mandatory parts of the school day, including the science curriculum and literacy hour.

The lessons were delivered by a student dentist and the class teacher. Each lesson followed a preset lesson plan with standardized worksheets, explanatory notes and demonstration items.

Prior to the teaching programme, the children completed a questionnaire designed to assess their

initial level of dental health knowledge. The questionnaire was repeated one week after the teaching session. In Manchester, it was repeated for a third time after the 7-week summer holiday. The questionnaire covered the aims set out in the National Curriculum. The questions were read out to the class, and the children ticked the relevant boxes to overcome any differences in literacy. The children were asked to choose one phrase to complete each sentence.

1 Our teeth's most important job is to:
Give us a nice smile
Help us eat food
Give our dentist something to look at

2 Our front teeth:
Chew our food
Tear our food
Are only there to give us a nice smile

3 Our back teeth:
Cut our food
Tear our food
Chew our food

4 During our lifetime we have:
Only 1 set of teeth
2 sets of teeth
Lots of sets of teeth

5 When we get our permanent teeth they have to last for:
1 year
6 years
The rest of our lives

6 If we do not look after our permanent teeth:
We will have fillings or we may loose our teeth
We will definitely have no problems they do not matter
They will look after themselves

7 Underline any of the foods that will not cause any harm to our teeth:
carrots, milk, sweets, chocolate, bread, cake, cola, cheese, lemonade, ice cream, crackers, oranges, ready salted crisps, biscuits, fruit juice, water, pizza, bowl of cereal.

Results

The questionnaires were scored by how many questions the children marked correctly. In the final section, where they were asked to underline any foods which are not harmful to teeth, they scored by correctly underlining any of the eight foods which were safe. The maximum possible score was 14. Mean scores are shown in Table 1.

Table 1. Questionnaire scores: (SD) standard deviation.

Variable	London	Manchester
(1) Before teaching		
Number	26	58
Mean	8·0	9·6
SD	2·0	1·9
(2) One week following teaching		
Number	26	57
Mean	11·4	10·9
SD	2·5	1·9
(3) Seven weeks following teaching		
Number	–	53
Mean	–	10·6
SD	–	1·6

Table 2. Questionnaire scores compared between London and Manchester.

Questionnaire	*t*-test	*P*-value
1	0·001	< 0·01
2	0·352	–

Table 3. Questionnaire scores compared over time.

Questionnaire	*t*-test	Significance
London		
2 versus 1	< 0·001	< 0·01
Manchester		
2 versus 1	< 0·001	< 0·01
3 versus 2	0·215	–
3 versus 1	< 0·001	< 0·01

The two-tailed Student's *t*-test was used to compare the scores for the knowledge questionnaires using the Microsoft Excel computer software package. The scores of the London schoolchildren were compared with those from Manchester at each stage (Table 2). The knowledge of the children in Manchester was significantly higher ($P < 0{\cdot}001$) than the London children prior to the teaching programme, but after the programme, knowledge levels were not significantly different ($P = 0{\cdot}352$).

Changes in knowledge within each school after the teaching programme were also measured using the two-tailed *t*-test (Table 3). There was a significant increase in knowledge for both schools after teaching had taken place ($P < 0{\cdot}001$). After the 7-week gap and the administration of the third questionnaire in the Manchester school, there was no significant decrease in knowledge ($P = 0{\cdot}215$). The scores were still significantly different from the questionnaires answered prior to teaching

($P < 0{\cdot}001$), with the children demonstrating retention of the newly acquired information.

Discussion

This study demonstrated that it is possible to increase oral-health-related knowledge following a simple teaching programme such as the one described here. No control group was used in this study, which means that the size of effect of the intervention cannot be quantified. However, the literature base is generally in agreement with these results. The important question is whether the improvement in knowledge can lead to actual health gains. Brown [4] suggested that they could, although this was a qualitative review and not as rigorous as the systematic reviews carried out by Kay and Locker [1], which concluded that there is still no evidence that knowledge, attitude and belief changes will lead to actual health gains. More positively, Sprod *et al*. [3] concluded that short-term changes in knowledge, attitudes and beliefs can lead to improvements in health. Measurements of health gains were not made in this study, and even in those studies where such changes have been quantified, the actual health gain is often too low to justify the cost of the intervention.

Psychosocial theories on why behaviour change occurs [14] highlight the complexities of the relationship between knowledge, attitudes and beliefs, and how these are strongly influenced by those around us. Knowledge may be important in forming these beliefs, but helpful attitudes and behaviours do not necessarily develop. These theories place great emphasis on the importance of supportive environments to enable individuals to make changes in health behaviours. Children's environments include the family and home setting, their peers, local social circumstances, and school. Existing barriers in these environments may include poor parental attitudes, a lack of oral hygiene resources and a lack of healthy dietary choices.

All these barriers to the ideal outcomes for health education are noted by the authors; however, few would suggest that we should stop education all together. Access to health information is one of the rights of individuals stated in the Ottawa Charter [15]. Watt *et al*. discussed the importance of evaluation of oral health promotion, but with 'measures that recognize the timescale required to achieve changes in health status as a result of any health promotion action' [16]. Although it may be a slow and complicated process, the information children receive in school may form part of the first tentative steps to forming their attitudes and beliefs which may later lead to healthier choices. Kay and Locker [1] also mentioned the ethical responsibility of the dental profession to provide such education. This study does this by optimizing on an available opportunity when children at school are being taught about teeth as part of their curriculum. More importantly, the costs are minimal, thus fulfilling the responsibility of the profession without using unjustifiable resources. Although student dentists helped to deliver the programme, it is an easily integrated package with detailed lesson plans and resources which should be attractive for teachers to use without professional input. Blinkhorn [17] suggested that there is a great deal of repetition in oral health promotion and that efforts should be collaborative. This sort of package could easily be made available nationwide. The National Curriculum Online has links to downloadable resources, and such resources could be provided by the dental profession along with other relevant links such as the new British Dental Association website aimed at schoolchildren (*www.3Dmouth.org*).

Further work is needed on the material to make it readily available, and it would be sensible to include other information to help schools develop policies to provide a more supportive environment, such as healthy menus for the snack shop and canteen. The need for more critical analysis of such a programme is recognized, and further work should be followed up with evaluations, such as those methods suggested for other age groups by Watt *et al*. [18] in the Department of Health's oral health promotion evaluation toolkit.

What this paper adds

- This paper seeks to add to the discussion on the effectiveness of oral health promotion, with a particular focus on the issues involved with producing a cost effective means of delivering oral health messages. The main focus is a discussion of the opportunities available to the profession of delivering oral health messages as part of the national curriculum.

Why this paper is important for paediatric dentists

- This paper is important for paediatric dentists who are at the 'coal face' since their insights will be vital to inform the discussion on how school based oral health promotion should be delivered. The paper will also inform paediatric dentists of the content and extent of oral health education which their patients are expected to have received at school.

In conclusion, the dental profession's oral health messages were easily integrated with the aims of the National Curriculum. Development and assessment of a more widely available teaching resource such as the one described in this study would be useful for encouraging the teaching profession to take on oral health education without more costly input from dental professionals.

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