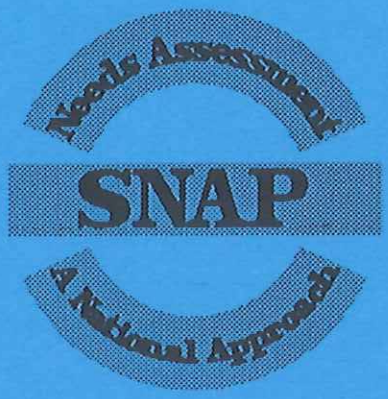
Scottish Needs Assessment Programme



Dental Caries in Children

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British Association for the Study of Community Dentistry. This activity allows monitoring of progress towards targets as well as facilitating comparisons with the rest of the UK and other countries. **The programme of core annual epidemiological surveys should continue in all Health Boards.**

9.5 **The core comparative epidemiological information should, however, be supplemented by the cost-effective collection and use of locally appropriate planning information about high caries risk groups and individuals.** This information should be capable of being readily used to direct effective health promotional, preventive and restorative care to those in greatest need.

9.6 **The attitudes to dental care of population groups in all areas of Scotland should be monitored, particularly with regard to changes in dental services for children, dental fear and dental indifference.** This process needs further research and development which should be carried forward in a consistent way, so that meaningful comparisons can be made.

9.7 There is accumulating evidence that the capitation system for dental care of children in the General Dental Services, as implemented, is associated with some significant shortcomings in terms of children's caries and restorative status. It is likely that the timescale and mode of introduction of this part of the 1990 GDS contract has combined with the change of expert opinions regarding best practice in recent years, to leave many GDS dentists ill-equipped to change their treatment planning philosophy and clinical decision making. **Consideration should be given to the development of acceptable and research-justified clinical guidelines detailing the ethos behind continuing preventive care, as well as the need to restore dentine caries in many circumstances. These guidelines should be made available to all those in the NHS dental services responsible for the treatment of caries in children.**

9.8 **A number of further areas for investigation relevant to reducing levels of caries in children are suggested:**

- 9.8.1 **a continuation of the (UK) national review of the implementation of the capitation scheme.**
- 9.8.2 **an examination of the feasibility of increasing the provision of appropriate care to high caries individuals in the 0-5 age group.**
- 9.8.3 **investigations to identify better high caries risk groups and individuals in NHS settings.**
- 9.8.4 **monitoring of the implementation of recommendations from the Nuffield report on the training and use of auxiliary personnel in dentistry,** in order to see what opportunities arise to develop and test cost-effective methods of reaching those children with an unmet treatment need.

9.9 **All of the new developments outlined in the recommendations above should be the subject of professional consultation (through Area Dental Committees and their GDP Sub-committees) and consumer consultations (through the Local Health Councils),** so that the particular characteristics and health status of each Health Board area can be reflected in devising locally tailored solutions to the continuing problem of high-caries children.

9.10 **Following the publication of the Government's response to the "Bloomfield" Report and the Oral Health Strategy for Scotland, specific "Action Points" should be identified for Health Boards** to ensure that an efficient, co-ordinated, multi-agency response is achieved, which is directed towards meeting the national target and reducing the preventable burden of dental caries in children in Scotland.

Scottish Needs Assessment Programme

Health Promotion Network

Dental Caries in Children

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Introductory note

Readers should be aware that dental services in Scotland and the United Kingdom are undergoing a period of rapid change and that as some key reports, policy announcements and an Oral Health Strategy for Scotland can be expected within the near future, it will be necessary to review this report in the light of these developments and to consider adding further, more specific recommendations. This report was drafted in March 1994.

Acknowledgments

We would like to acknowledge the contributions of other members of the SNAP Oral Health Group and all those who have helped in the production and proofing of this report.

SNAP Reports currently available

Total Elective Hip and Knee Replacement - a comparative assessment
Cataract Surgery
Congenital Dislocation of the Hip
Global Needs Assessment - a screening tool for determining priorities
Increasing Choice in Maternity Care in Scotland - Issues for Purchasers and Providers
Breastfeeding in Scotland
Improving Gynaecology Services Within Existing Resources - A Programme Budgeting and Marginal Analysis Approach
Cancer Care in Glasgow - A Model for Regional Cancer Care in Scotland
Inpatient Resources for Communicable Disease in Scotland

CONTENTS

EXECUTIVE SUMMARY AND (JUNE 1994) RECOMMENDATIONS

1.1 Statement of the problem - Dental caries (tooth decay) is a preventable multi-factorial disease, associated with significant costs, morbidity, and some mortality. Dental fear, arising from initial experiences in childhood, is still a significant problem in setting up negative dental attitudes which persist into adult life while dental indifference is responsible for failures to access services or respond to preventive advice. There is much to be done if the existing national target for 5-year-olds is to be met and if appropriate local targets are to be specified and achieved.

1.2 Attitudes and behaviour - Determining the views of service consumers and non-consumers is an important but very difficult task, especially in the case of young children. Equally, understanding and influencing parents' and children's attitudes and behaviours is important if progress is to be made in caries prevention and management. Dental caries can be said to be a behavioural disease and is closely related to lifestyle. Many parents are aware that sugary foods are bad for their children's teeth, but feel that the 'cost' of restricting sugary foods is simply too high a price to pay for the uncertain aim that their children will have nice teeth some time in the future. The current oral health General Public Programme of the Health Education Board for Scotland, targeting pre-school children, parents, grandparents and carers of the under 5s aims to raise awareness of good dental health among the target population in a positive way. It will provide an opportunity for professional action at Health Board level.

2 Diagnosis of caries in children - There is a major problem of different interpretations and usage of some key dental terms across different parts of dentistry which is a trap for the unwary. The disease of caries is measured in a number of different, but superficially similar, ways which can readily give rise to confusion and the inappropriate use of epidemiological and service data.

2.1 Measurement methods in clinical practice - General Dental Practitioners (GDPs) will detect and plan care for a range of lesion sizes from the just discernable lesion appearing as a white area of altered translucency (D1 lesions), to small surface breaks in the outer enamel surface of the tooth (D2 lesions) and the well established lesion extending through the enamel into the dentine, the inner part of the tooth, (D3 lesions).

2.2 Measurement methods in research - Research has demonstrated great variability between dentists in detecting and grading lesions and that many existing clinical methods are relatively insensitive in detecting lesions at the stage where early preventive interventions have the best chance of working effectively.

2.3 Measurement methods in epidemiology - It must be appreciated that the traditional level of measurement in dental epidemiology has been a frank lesion into dentine requiring a filling. Recording at this comparatively gross level is essential if survey results are to be compared with other countries and with surveys conducted previously. It is imperative that all concerned understand that many children who are described as 'caries free' on the basis of an epidemiological assessment are very likely to ***have*** dental caries when measured by clinicians in the General Dental Service or in the Community Dental Service.

2.4 Measurement methods in screening - This activity uses an even more gross assessment of caries status. In a dental context, screening is a rapid inspection of the oral cavity carried out on large numbers of subjects by a dentist using a mouth mirror and sufficient illumination to ensure good observation.

3 Epidemiology of caries in children

3.1 Caries prevalence in key age groups - Since 1987, dental caries prevalence throughout Scotland has been monitored by the Scottish Health Boards' Dental Epidemiological Programme (SHBDEP), a joint venture between all 15 Health Boards (through the CADOs Group) and Chief Scientist Office's Dental Health Services Research Unit in Dundee. These surveys regularly demonstrate that Scottish children have more caries than their peers elsewhere in Great Britain.

The results of surveys of 5-year-olds provide the most sensitive barometer of change. It should be noted that the distribution of disease is now markedly skewed and that there has been an increase in disease levels for those with most disease. Therefore, it would seem appropriate to increase preventive activities focused upon those with most disease.

3.2 Trends in caries experience - It is evident that although caries experience was declining satisfactorily for 5 and 12-year-olds between 1983 and 1987/88, the rate of decline has slowed markedly in 12-year-olds and has ceased for 5-year-olds. Data from other high caries areas in the United Kingdom also demonstrate the same trends.

3.3 Trends in the provision of care - Trends in the make-up of the component parts of the Decayed Missing and Filled Index suggest that the provision of fillings has declined markedly, whilst untreated dentinal decay has risen. The proportion of the caries experience made up of fillings (the Care Index) has been showing a deterioration in 5-year-olds for some time and a similar pattern is now being seen for 12-year-olds as well.

3.4 Targets for 5-year-olds - The national target relating to children is that by the year 2000 '60% of 5 year old school entrants should have neither cavities nor have had fillings or extractions'. Over the last four years there has been little progress made in approaching this target. Further preventive initiatives are required if the national target is to be met.

3.5 Information for Health Services Research - The Scottish Dental Practice Board (SDPB) has a wealth of data relating to dental services in Scotland. Elements of these should be of considerable value to Health Boards and health services researchers, once improvements in the quality of the data being collected from GDPs can be made.

3.6 New information available and awaited imminently - It should be appreciated that the full results of the 1993/94 SHBDEP survey of 5-year-olds and the 1993 UK Survey of Children's Dental Health are awaited. Similarly, the imminent Green Paper on the General Dental Services and the publication of Oral Health Strategies for Scotland (and England) will have a direct bearing on both central policies and the future contracting framework.

4 Organisation of Dental Services for children - The bulk of care for children (70-80%) is provided by independent practitioners in the General Dental Service working to a nationally agreed contract. The Community Dental Service aims to provide complementary care for special needs groups and those who cannot or will not seek care within the GDS. The Hospital Dental Service provides secondary care; while the traditional dental specialties are provided at a number of sites some sub-specialties are only found at present in the two undergraduate schools in Dundee and Glasgow.

5 Prevention of caries in children - Prevention is seen as the key to achieving health gain. A wide variety of measures exist as Population Measures, Small Groups Preventive Measures and Individual Programmes. Water fluoridation is the preferred and most effective route, but where this is not deliverable, the targeted use of fluoride toothpaste to those who do not yet have access to it, combined with further

individualised preventive care involving fluoride and fissure sealants under the supervision of a dentist is seen as the way forward, while salt should be assessed as a vehicle for fluoride in Scotland.

6 Treatment of caries in children - There have been radical changes in the concepts of 'ideal' treatment in dentistry. The ***extractive phase*** gave way to the ***restorative phase*** which has been replaced by the ***preventive phase***. Many dentists and health professionals need to be made aware of this change. Too many teeth are still being extracted.

7&8 Costs and related issues/Strategies for the Future - Further work in these areas must await the publication of the Green Paper on remuneration in the General Dental Services and the Scottish Oral Health Strategy. Interim recommendations are set out below.

9 Recommendations

(prior to publication of an Oral Health Strategy for Scotland and the Government Response to the "Bloomfield" Report)

9.1 The three Dental Services should develop towards providing more integrated and effective ways of delivering appropriate dental care to prevent and manage dental caries in all children residing within Scotland. It must be recognised that there are wide diversities in dental caries status both between and within Health Board areas. It should also be appreciated that the bulk of restorative care is provided by the General Dental Services (GDS), the Community Dental Services (CDS) currently provides individual care to priority groups (including many of those children who cannot/will not access the GDS) as well as preventive programmes, while the Hospital Dental Service (HDS) provides a wide range of secondary and some primary care for children within the Dental Hospital catchment areas. **As the minority with most of the disease may not presently be securing treatment within the GDS, Research and Development work should be pursued in order to achieve national targets for 5-year-olds. R&D led changes should aim to:**

9.1.1 improve current performance in delivering caries prevention and appropriate restorative care.

9.1.2 find ways of reducing the present inequalities in the dental health of children.

9.1.3 ensure that the full range of appropriate dental services are available for all children.

9.2 **Progress in caries prevention should be achieved employing both 'population' and 'high risk' strategies.** Water fluoridation remains the method of choice on the grounds of effectiveness and cost. If, however, it is not possible to implement fluoridation, alternative preventive strategies must be pursued and these should recognise the skewed distribution of disease in the population.

9.3 **Appropriate health promotion programmes designed to reach those in most need (in terms of caries risk status) should be purchased, delivered and evaluated in all Health Boards exploiting a multi-agency, multi-sectorial approach.** The current oral health programme from HEBS should be exploited and built-on locally. Plans to ensure a continuity of health promotion activity related to dental caries and diet in children after this programme must be secured in all Boards if progress towards the national target is to be achieved and maintained.

9.4 At present a core of comparative epidemiological caries data is collected from representative but limited samples of children from each Health Board area each year; these Scottish Health Boards' Dental Epidemiological Programme surveys are conducted according to the timetable and core protocol of the

British Association for the Study of Community Dentistry. This activity allows monitoring of progress towards targets as well as facilitating comparisons with the rest of the UK and other countries. **The programme of core annual epidemiological surveys should continue in all Health Boards.**

9.5 **The core comparative epidemiological information should, however, be supplemented by the cost-effective collection and use of locally appropriate planning information about high caries risk groups and individuals.** This information should be capable of being readily used to direct effective health promotional, preventive and restorative care to those in greatest need.

9.6 **The attitudes to dental care of population groups in all areas of Scotland should be monitored, particularly with regard to changes in dental services for children, dental fear and dental indifference.** This process needs further research and development which should be carried forward in a consistent way, so that meaningful comparisons can be made.

9.7 There is accumulating evidence that the capitation system for dental care of children in the General Dental Services, as implemented, is associated with some significant shortcomings in terms of children's caries and restorative status. It is likely that the timescale and mode of introduction of this part of the 1990 GDS contract has combined with the change of expert opinions regarding best practice in recent years, to leave many GDS dentists ill-equipped to change their treatment planning philosophy and clinical decision making. **Consideration should be given to the development of acceptable and research-justified clinical guidelines detailing the ethos behind continuing preventive care, as well as the need to restore dentine caries in many circumstances. These guidelines should be made available to all those in the NHS dental services responsible for the treatment of caries in children.**

9.8 **A number of further areas for investigation relevant to reducing levels of caries in children are suggested:**

- 9.8.1 **a continuation of the (UK) national review of the implementation of the capitation scheme.**
- 9.8.2 **an examination of the feasibility of increasing the provision of appropriate care to high caries individuals in the 0-5 age group.**
- 9.8.3 **investigations to identify better high caries risk groups and individuals in NHS settings.**
- 9.8.4 **monitoring of the implementation of recommendations from the Nuffield report on the training and use of auxiliary personnel in dentistry,** in order to see what opportunities arise to develop and test cost-effective methods of reaching those children with an unmet treatment need.

9.9 **All of the new developments outlined in the recommendations above should be the subject of professional consultation (through Area Dental Committees and their GDP Sub-committees) and consumer consultations (through the Local Health Councils),** so that the particular characteristics and health status of each Health Board area can be reflected in devising locally tailored solutions to the continuing problem of high-caries children.

9.10 **Following the publication of the Government's response to the "Bloomfield" Report and the Oral Health Strategy for Scotland, specific "Action Points" should be identified for Health Boards** to ensure that an efficient, co-ordinated, multi-agency response is achieved, which is directed towards meeting the national target and reducing the preventable burden of dental caries in children in Scotland.

1 INTRODUCTION

1.1 Statement of the problem

Dental caries (tooth decay) is a preventable multi-factorial disease, associated with significant costs, morbidity, and some mortality. Caries levels in Scottish children are higher than in their peers in other parts of Great Britain and trends showing improvements in children's dental health have slowed in the older age groups and ceased in the case of 5-year-olds. Dental fear, arising from initial experiences in childhood, is still a significant problem in setting up negative dental attitudes which persist into adult life, while dental indifference is responsible for failures to access services or respond to preventive advice. There is much to be done if the existing national target for 5-year-olds is to be met and if appropriate local targets are to be specified and achieved. The target specified that by the year 2000 '60% of 5-year-old school entrants should have neither cavities nor have had fillings or extractions' (HEBS 1991).

1.2 Attitudes and behaviour

Determining the views of service consumers and non-consumers is an important element in ensuring that services are appropriate and in securing improvements in oral health. It should, however, be appreciated that the acquisition of ***valid*** insights into consumers' views is a very difficult task, especially in the case of young children where parental attitudes dominate. It is important to establish what events trigger lasting dental fears and phobias later in life and what factors are involved in overcoming dental indifference sufficiently to achieve regular attendance and compliance with preventive advice. At present the 'I couldn't be bothered' response from children and parents remains a major barrier to improving the caries status of Scottish children.

Understanding and influencing parents' and children's attitudes and behaviours is important if progress is to be made in caries prevention and management. Dental caries can be said to be a behavioural disease and is closely related to lifestyle. Many parents are aware that sugary foods are bad for their children's teeth, but feel that the 'costs' of restricting sugary foods is simply too high a price to pay for the uncertain aim that their children will have nice teeth some time in the future.

The period of primary socialisation within the family is important for determining whether a child will enter school with a healthy dentition. It is known that a mother's attendance pattern at the dentist closely influences that of her children (Crawford and Lennon, 1992). For those parents of pre-school children who do not attend early, other health professionals such as health visitors are an important means of influencing those at risk. In a middle class family, socialisation will include the adoption of toothbrushing and healthy dietary habits and restriction of sugar. Secondary socialisation takes place when the child starts school, and the peer group and teachers play an important role in determining behaviour.

There are important social differences in the way sugar is used in different sectors of society. Children in deprived areas get sweets more frequently, sweets are used to keep the child quiet, or because the child demands sweets. Children in more affluent areas are more likely to get a restricted amount of sweets such as at weekends or after meals, taking into account the frequency/sugar with meals message (Blinkhorn, 1982). During adolescence, the young adult develops more and more as an individual person and begins to formulate his/her behaviour.

Currie (Currie and Todd, 1992), in her study of the health behaviours of Scottish schoolchildren, found that 'unhealthy' or risk behaviours such as smoking and drinking were associated with one another. Children who smoked regularly were more likely to drink regularly. This is not necessarily a causal relationship, but rather similar factors influence the establishment of both patterns of behaviour in young children. In a similar vein, healthy behaviours were associated with one another, thus children who took regular exercise were more likely to eat healthy foods and brush their teeth regularly. Thus, it is suggested that a topic-based approach to health education that does not take adequate account of other aspects of health may be less effective. Generally, there is a move away from a disease-centred approach to a more positive lifestyle oriented approach in health promotion. Much dental health education in the past has focused upon information transfer, with the assumption that behaviour change will automatically follow the imparting of knowledge about tooth decay. It is now known that this assumption is incorrect and simplistic and that behaviour change is a complex process.

The current oral health General Public Programme of the Health Education Board for Scotland, targeting pre-school children, parents, grandparents and carers of the under-5s aims to raise awareness of good dental health among the target population in a positive way. It will provide an opportunity for professional action at Health Board level. The content of the programme includes giving recognition that oral health care is a key part of the whole process of caring for the under-5s and focuses in on regular brushing with children's fluoride toothpaste and decreasing frequency of consumption of sugary snacks. Using television, press adverts and information packs, the campaign will give information about good oral health practices and accessing services. The tone of the campaign will be positive and helpful, reinforcing and not judgemental and will avoid making the target group defensive. This initiative should be built on and exploited in ways which are appropriate locally.

2 DIAGNOSIS OF CARIES IN CHILDREN

There is a major problem of different interpretations and usage of some key dental terms across different parts of dentistry which is a trap for those outside the profession as well as those within it. The disease of caries is measured in a number of different, but superficially similar, ways which can readily give rise to confusion (Pitts, 1991 a) and the inappropriate use of epidemiological and service data.

2.1 Measurement methods in clinical practice

General Dental Practitioners (GDPs) use a variety of different basic methods to detect the presence and extent of dental caries which may largely reflect the particular shades of opinion held by teachers when they qualified. There have been significant shifts of expert opinion (Davis et al, 1992) which now advocate the use of visual rather than tactile clinical methods of diagnosis and the individualised use of diagnostic aids including, where appropriate, dental radiography (Pitts, 1991b, 1991c, 1992). The GDP will recognise, detect and plan care for a range of lesion sizes (Nuttall et al, 1993) from the just discernible lesion appearing as a white area of altered translucency (D1 lesions), reliably visualised only after cleaning and drying the tooth, to small surface breaks in the outer enamel surface of the tooth (D2 lesions) and the well established lesion extending through the enamel into the dentine, the inner part of the tooth (D3 lesions).

2.2 Measurement methods in research

Various new diagnostic methods are being developed and evaluated to aid the dentist in a difficult task which is becoming harder as the morphology of lesions changes and practitioners are confronted with more teeth which are apparently intact but which conceal substantial dentine lesions. Present research has demonstrated great variability between dentists in detecting and grading lesions and that many existing clinical methods are relatively insensitive in detecting lesions at the stage where early preventive interventions have the best chance of working effectively.

2.3 Measurement methods in epidemiology

It must be appreciated that the traditional level of measurement in dental epidemiology has been a frank lesion into dentine requiring a filling. Recording at this comparatively gross level is essential if survey results are to be compared with other countries and with surveys conducted previously. However, the fundamental difference between recording at the dentine (D3) level, which is used in the Scottish Health Boards' Dental Epidemiological Programme and the UK Surveys, and the more sensitive (D1) level, used by clinicians, must be appreciated (Pitts and Fyffe, 1988). As an example, in regularly attending 12-year-olds the mean number of Decayed, Missing and Filled Teeth (the so-called DMFT Index; dmft for primary teeth) was found to be 1.0 at the D3 'survey' level but 11.8 at the D1 'clinician' level (Pitts et al, 1993). A further complication is that open cavitation has become more of a rarity and epidemiological criteria have had to evolve to reflect this change in the presentation of disease (Pitts, 1993). The inaccuracies of making simplistic predictions of subsequent dental treatment on the basis of epidemiological data collected at the dentine (D3) level has been demonstrated (Nuttall and Davies, 1988).

Given the above and the existence of the national target, it is imperative that all concerned understand that many children who are described as 'caries free' on the basis of an epidemiological assessment are very likely to ***have*** dental caries needing preventive or restorative care when measured at the diagnostic thresholds employed by clinicians in the General Dental Service (GDS) or in the Community Dental Services (CDS). It is also important that locally appropriate methods of obtaining information at a small area level (that is smaller than the representative Health Board sample used for the SHBDEP surveys) are developed in all Boards in order to inform purchasers and providers about the impact of services upon the high risk groups that can be defined (Dowell et al, 1992).

2.4 Measurement methods in screening

This activity uses an even more gross assessment of caries status than the epidemiological measures. A traditional 'medical' definition of screening is the presumptive identification of unrecognised disease or defect by the application of tests, examinations or other procedures which can be applied rapidly. Thus, in a dental context, screening is a rapid inspection of the oral cavity carried out on large numbers of subjects by a dentist using a mouth mirror and sufficient illumination to ensure good observation.

Screening may involve the entire group or may be selective and applied only to high risk subjects of the group. A well organised screening programme should respond to four main quality issues: cost, effectiveness, frequency and the use of a protocol. Guidance to Health Boards on the Future Role of the Community Dental Service in Scotland (SHHD/DGM (1989) 15) stated that screening of the teeth of children in state funded schools should take place at least three times in each child's school life (in areas of poor dental health and where availability of services is poor, such screening may need to be more frequent).

Decisions should be made locally about who should be screened and how often, in order that the dental health of sections of the community most at risk will be protected. Although dental screening is carried out in every Health Board area, there is no uniform methodology in existence which might allow more critical comparison of ISD(S) 23 screening statistical returns on an inter-Board and national basis. Indeed this whole area could be reviewed as the importance of identifying the risk groups who suffer the majority of the disease becomes clearer.

The main objective of screening is to detect dental disease or anomaly and, where evidence of this is found, to refer the individual for full examination and eventual treatment. Screening can, therefore, give some information on the proportion of a group requiring investigation and treatment at a given time, as well as the number with "zero caries" as defined on ISD(S) 23. Screening cannot, however, give detailed epidemiological information, such as caries prevalence.

Dental screening has the ultimate aim of promoting improvement in the dental health status of the individual and the community as a whole. It has been shown to be most effective in areas of high unemployment, where disease levels tend to be highest, there is a low level of service availability and the normal attendance rates are low prior to screening (Zarod and Lennon, 1992). Alternative methods of screening looking at attitudes, behaviours and attendance are being advocated and should also be explored.

3 EPIDEMIOLOGY OF CARIES IN CHILDREN

3.1 Prevalence of disease in key age groups

Since 1987 dental caries prevalence throughout Scotland has been monitored by the Scottish Health Boards' Dental Epidemiological Programme (SHBDEP) which is a joint venture between all 15 Health Boards (mediated through the CADOs Group) and Chief Scientist Office's Dental Health Services Research Unit in Dundee (Pitts and Davies, 1992). The annual reports of the Programme's surveys are available in all Boards and detail the findings (Pitts and Davies, 1988; Pitts and Davies, 1989; Pitts and Davies, 1990; Davies and Pitts, 1991a; Davies and Pitts, 1991b; Pitts and Nugent, 1992; Pitts et al, 1993). The SHBDEP surveys are coordinated with those carried out across the rest of Great Britain through the British Association for the Study of Community (Pitts and Palmer, 1994). These surveys regularly demonstrate that Scottish children have more caries than their peers elsewhere in Great Britain.

The results of surveys of 5-year-olds provide the most sensitive barometer of change. Examinations of randomly selected samples from each Health Board are conducted by 40 teams who, each year, attended a formal training and calibration course. Clinical examination is conducted in schools using a mobile examining light and mirror, a predominantly visual technique with no supplemental diagnostic aids; caries is recorded at the dentinal level.

In 1987-88 a representative sample of 4472 5-year-old children were examined, the corresponding figures for 1989-90 and 1991-92 were 4401 and 5001. The weighted mean dmft for Scotland were: in 1987-88 = 2.73 (range of Health Board means 1.86 -3.40); in 1989-90 = 2.82 (range of means 1.88-3.65); in 1991-92 = 2.88 (range of means 1.68-3.34). The percentages of children 'free' of caries experience at the dentinal level of diagnosis in 1987-88, 1989-90, 1991-92 were 42.4%, 41.8% and 42.8% respectively. The weighted mean number of teeth with 'unrestorable decay' increased markedly from 0.28 in 1989-90 to 0.40 in 1991-92, while the mean f component declined to a low of 0.40 in 1991-92 from a high of 0.52 seen in 1989-90.

It should be noted that the distribution of disease is now markedly skewed and that there has been an increase in disease levels for those with most disease. Therefore, it would seem appropriate to increase preventive activities focused upon those with most disease. Figures 1 and 2 highlight, for 5-year-olds and 12-year-olds respectively, the skewed distribution of dental caries among Scottish children. There is also a wealth of literature linking those groups of children and adults at high risk to dental caries and treatment with low social class (Eddie and Davies, 1985) and deprivation.

3.2 Trends in caries experience

Figure 3 summarises the trends in caries prevalence over the last 10 years. It is evident that although caries experience was declining satisfactorily for 5 and 12-year-olds between 1983 and 1987-88, more recent data suggest that the rate of decline has slowed markedly in 12-year-olds and that it has ceased for 5-year-olds. BASCD data from other high caries areas in the United Kingdom also demonstrates the same trends (Pitts and Palmer, 1994).

3.3 Trends in the provision of care

More disturbing still is the make up of the component parts of the Decayed Missing and Filled Index. Trends here suggest that the provision of fillings has declined markedly, while untreated dentinal decay has risen. The proportion of the caries experience made up of fillings (the Care Index) has been showing a deterioration in 5-year-olds for some time and a similar pattern is now being seen for 12-year-olds as well (Pitts and Palmer, 1994).

3.4 Targets for 5-year-olds

The national target relating to children is that by the year 2000 '60% of 5-year-old school entrants should have neither cavities nor have had fillings or extractions' (HEBS 1991). The wording appears differently in other documents where '60% free of decay' has been used, this is a potential source of confusion (see Section 2.3). Figure 4 demonstrates the recent lack of progress in approaching this target. If the target is to be achieved then concerted preventive efforts are required.

Caries levels in 5-year-olds in Scotland are high in Great Britain terms (although low compared with some other European countries and with historical comparisons for Scotland). The falls previously seen in mean caries levels for the 5-year-old group have ceased and there has been little ***overall*** change between 1987-1991. Recent changes in the pattern of care are not encouraging and further (preventive) initiatives are required if the national target is to be met.

3.5 Information for Health Services Research

The Scottish Dental Practice Board (SDPB) has a wealth of data relating to dental services in Scotland. While they are constrained by the important task of paying dentists in the GDS for claims submitted, their new remit includes elements of R&D which should be of value to Health Boards and health services researchers.

Under the 1990 GDS contract capitation payments are made to GDPs in respect of the number of children they have registered. On the claim forms dentists are asked to fill in the number of decayed missing and filled teeth for each child but, as yet, there is little information about the validity of these data. The SDPB and their Dental Practice Division kindly provided the SNAP Oral Health Group with details of the capitation registration data at 31 January 1994 and the dentists' own estimates of dmf under parts 7 and 8 of the capitation forms.

These showed that there were 37 952 patients aged 5 years registered for whom it was claimed that 75 194 teeth were decayed, 9 132 were missing and 15 174 were filled. These numbers are comparable with the epidemiological findings in terms of the imbalance between decayed and filled teeth (there were approximately five times as many decayed as filled). They also accord in gross terms with the epidemiological estimates of mean dmf of the population, as a mean of 2.62 was obtained from the SDPB data as compared to the value of 2.88 from the 1991-92 SHBDEP report. However, these data relate only to the subset of the population who are registered who might be expected to have better levels of oral health. This information cannot be used reliably at lower levels (ie by Health Board), as the lack of guidance to GDPs about what criteria to use when completing this part of the claim and the influence of the "weighted entry payment system" for high caries children cannot be assessed at present.

It would seem highly desirable to improve the quality of the information held about children treated under capitation and for the SDPB to work with Health Boards and others to make sure that the information can be fully used within the National Health Service. The number of registrations for 5-year-olds and younger children are still disappointingly low and efforts must, therefore, be made to improve attendance of very young children who should visit a dentist no later than when the first tooth appears in the mouth.

3.6 New information available and awaited imminently

It should be appreciated that pertinent new information and policy recommendations should be available shortly. The results of the 1993-94 SHBDEP survey of 5-year-olds and the full results of the 1993 UK Survey of Children's Dental Health conducted by OPCS are awaited with interest. Similarly, the imminent publication of a Green Paper on the General Dental Services followed by the formulation of new Oral Health Strategies for Scotland (and England) will have a direct bearing on both the thrust of central policies and the contracting framework that will obtain in the future.

Fig 1.

Skewed Distribution of Decay for 5 year olds in Scotland 1991/92

(d measured at the caries into dentine level)

d surfaces
3% of population had 25% of decayed (d) surfaces
10% of population had 50% of decayed (d) surfaces
50% of population had 100% of decayed (d) surfaces

dmft
6% of population had 25% of decayed, missing or filled teeth (dmft)
15% of population had 50% of decayed, missing or filled teeth (dmft)
58% of population had 100% of decayed, missing or filled teeth (dmft)

Fig 2.

Skewed Distribution of Decay for 12 year olds in Scotland 1992/93

(D measured at the caries into dentine level)

D surfaces
2% of population had 25% of decayed (D) surfaces
7% of population had 50% of decayed (D) surfaces
39% of population had 100% of decayed (D) surfaces

DMFT
6% of population had 25% of decayed, missing or filled teeth (DMFT)
17% of population had 50% of decayed, missing or filled teeth (DMFT)
64% of population had 100% of decayed, missing or filled teeth (DMFT)

Fig 3.

Trends in caries prevalence for Scottish children, 1983 - 1993.

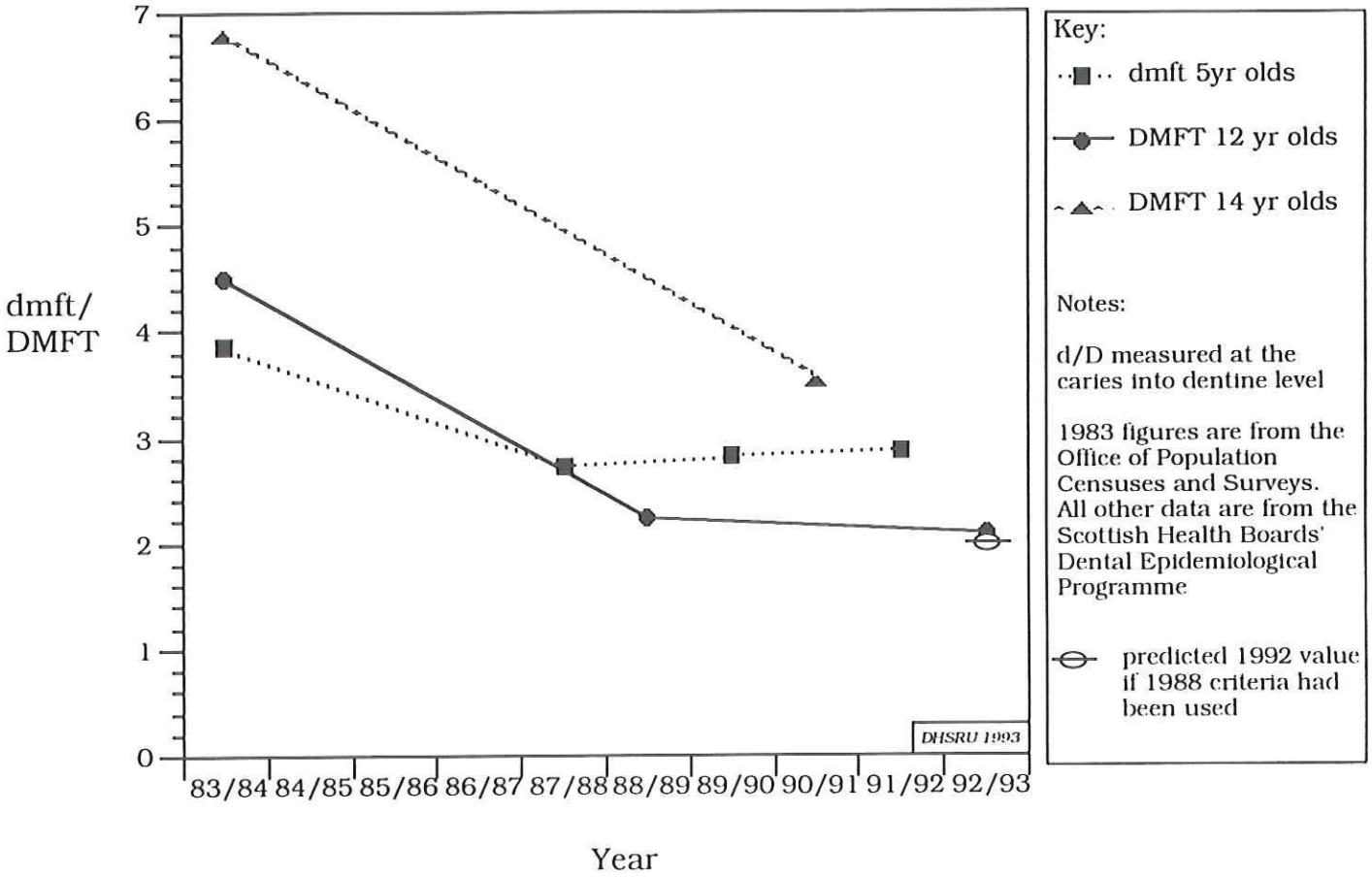
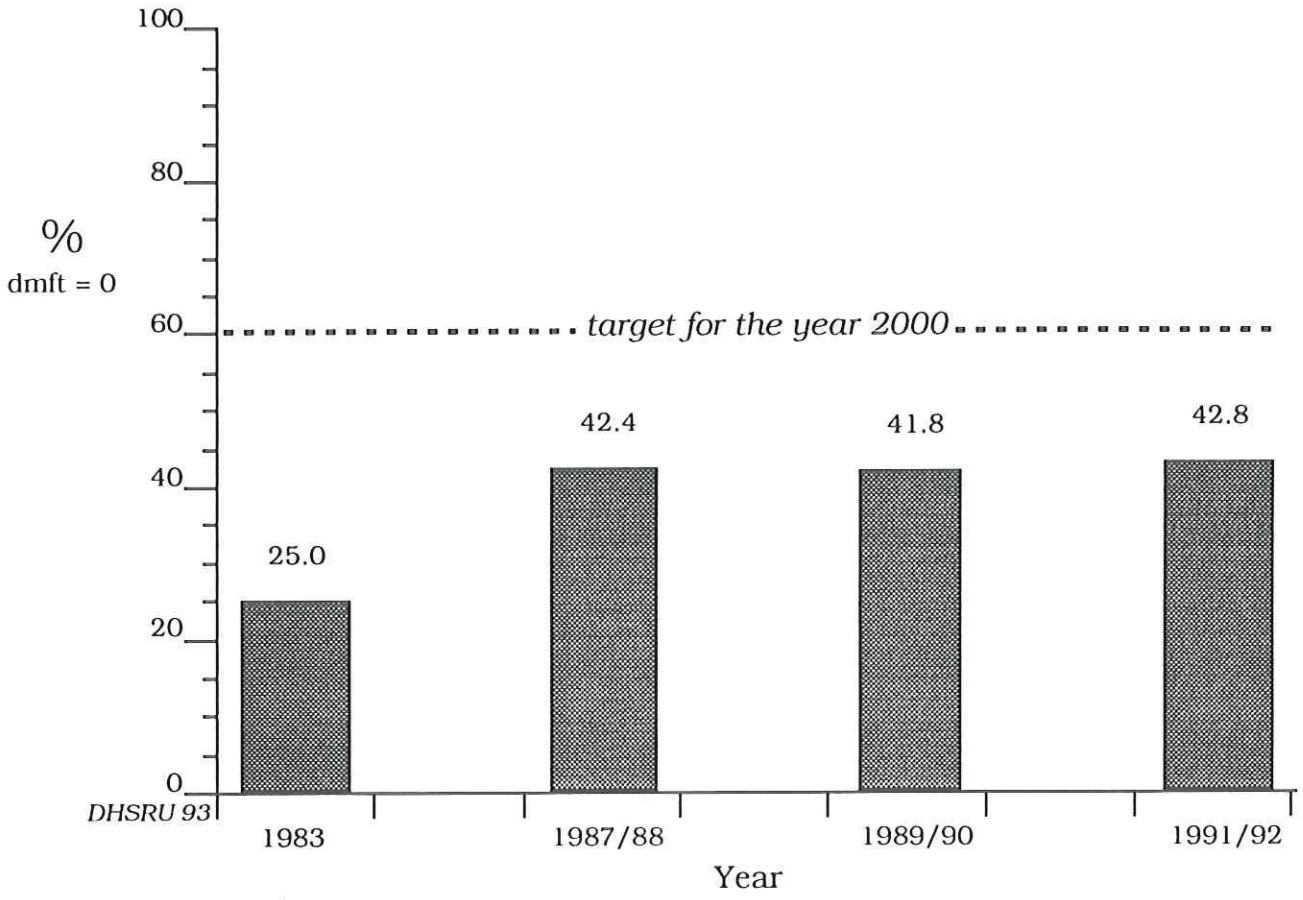


Fig 4.

Changes in the percentage of Scottish 5 year olds free of decayed,* missing or filled teeth, 1983 - 1993. *(when measuring at the caries into dentine level)



4 ORGANISATION OF DENTAL SERVICES FOR CHILDREN

Overall, the large majority of children attend dental services, with 70-80% of children recorded attending a General Dental Practitioner within a year in Scotland. The main source of primary dental care is the General Dental Service although there is significant contact with children through the Community Dental Services in the screening, health promotion and treatment programmes.

4.1 General Dental Service (GDS)

The General Dental Practitioner service is the main primary care dental service. The majority of General Dental Practitioners are independent contractors who can treat children and young people below 18 years of age under a capitation agreement. This agreement allows for the provision of a full range of free dental care including examination, curative and preventive treatments as well as some more complex restorative and orthodontic procedures.

The dentist is remunerated for the routine care provided under capitation by a monthly fee related to the age band in which the patient is placed. In addition, there is a range of item of service payments available for exceptional treatments, eg - general anaesthesia, endodontics, etc. The monitoring and authorisation of payments of the service is undertaken through a central authority, the Scottish Dental Practice Board and Dental Practice Division of the Common Services Agency. Practitioners may also treat children outwith capitation on an 'occasional' basis usually for the treatment of a specific problem.

Individual General Dental Practitioner contracts are held by the Primary Care Department of Health Boards. General Dental Practitioners are professionally represented on Area Dental Committees of Boards typically through members elected from Local Dental Committees.

General Dental Practitioners are independent contractors who can choose whether or not to treat children under the National Health Services Capitation Agreement. In addition, there is no restriction on where a dentist may practice and this is often dictated by market forces. Due to these factors, it is therefore difficult to plan general dental services to reflect the needs of the community.

4.2 Community Dental Service (CDS)

The Community Dental Service is a directly managed service in which the staff are remunerated by salary. As a directly managed service provider the Community Dental Service should be able to negotiate, agree and deliver service agreements with the purchaser which will accurately reflect the health needs of the population and which will contain appropriate quality measures.

There has been considerable organisational change to the service as a result of the recent National Health Service changes. In 1989, the Scottish Home and Health Department circulated in SHHD/DGM (1989) 15, guidance to Health Boards on the Future Role of the Community Dental Service. Two important functions were identified in this circular.

The first was **public health**, to include screening, health promotion and preventive public health programmes.

Preventive dental services for children are delivered to groups in nursery, playgroup and school settings in addition to individual clinically-based preventive activity.

Given recognition of the increased importance of oral health promotion, Community Dental Services may seek to develop Senior Dental Officer (Health Promotion) or Dental Health Educator/Oral Health Promoter posts. This should improve the effective organisation of preventive activities within the service provided integration with other activities can be achieved.

The second function was the **treatment objective** of the service, identifying the shift more towards complementing the General Dental Service by identifying special needs groups and acting as a safety net treatment service for those patients who cannot or will not obtain treatment from the General Dental Service.

Patients may be treated in health centres, clinics or mobile units. The latter are particularly useful in improving access for children in remote areas or in urban areas where there is no locally available General Dental Practitioner. Increasingly, general anaesthetic services provided by the Community Dental Service are sited in hospital locations in the interests of patient safety.

Whereas all Boards previously had one Community Dental Service, some now have more than one depending on factors such as the geographical split of Units and Trusts within the area. This may, in some cases, make the organisation and delivery of the service less effective due to uneven distribution of resources. It may also in theory lead to competitive tendering within a Board's area.

4.3 Hospital Dental Service (HDS)

These services are supplied throughout Scotland in district hospitals, large teaching hospitals, regional specialist units and in dental teaching hospitals.

The traditional dental specialities of orthodontics and oral & maxillo-facial surgery are present in most district hospitals. Restorative dentistry, oral medicine and paediatric dentistry are specialities based in dental teaching hospitals with limited outreach services to other hospitals and Health Boards.

The majority of work undertaken in the dental specialities is out-patient based. In-patients make a major contribution only to the work of the oral and maxillo-facial surgery speciality. Children are a major component of the work of the specialities of paediatric dentistry and orthodontics but a minor part of other specialities.

The service is a salaried service provided in future through National Health Service Trusts throughout Scotland. The size distribution and structure of these services will vary considerably throughout Scotland. Access to these Hospitals will therefore also vary depending upon geographical location. Dundee and Glasgow remain as Dental Teaching Hospitals, while Edinburgh is to have a Dental Hospital re-established in the near future.

5 PREVENTION OF CARIES IN CHILDREN

5.1 Population Measures/Public Health Programmes

5.1.1 Water Fluoridation

The term 'water fluoridation' refers to the adjustment of the fluoride concentration in community water supplies in a northern, temperate climate to one part per million. The effect of fluoride (in water supplies) on caries was established in the 1930s. A caries survey carried out in 21 American cities showed an inverse relationship between caries levels and water fluoride concentration. Water fluoridation schemes have been in existence since 1945, and in a review of 113 studies into the effectiveness of water fluoridation in reducing caries levels in 23 countries (Rugg-Gunn and Murray, 1991) it was found that the modal percentage reduction was 40-49% for deciduous teeth and 50-59% for permanent teeth. Thus both dentitions are affected and the benefits last throughout adult life.

Community water fluoridation schemes provide the greatest benefit to those in greatest need. For children with negative oral health behaviour, water fluoridation can reduce their unequal experience of dental disease (Carmichael et al, 1984).

Costs of community water fluoridation have been extensively reviewed in the United States where water fluoridation is most widely practised and where it is claimed that water fluoridation was one of the most cost-effective preventive dental programmes and, indeed, might be one of the most cost-effective preventive programmes in health care. Water fluoridation is the most cost-effective when applied to large populations with high caries levels (Birch, 1990).

The safety of water fluoridation has been endorsed by all major national and international professional bodies as well as the World Health Organization.

Currently, enabling legislation governing the introduction of fluoridation of community water supplies (The Water [Fluoridation] Act 1985) requires that the public must be informed before any final decision is taken on the subject. Despite this enabling legislation, because of opposition to fluoridation of water supplies, no water fluoridation scheme exists in Scotland and no Health Board has successfully advanced towards this goal.

In the absence of additional legislation which would make it mandatory for water supplies to implement the request of a Health Board to adjust the fluoride levels of water, it may not be possible to progress this valuable public health measure successfully.

Health Boards should, nevertheless, continue to promote the concept of water fluoridation by raising public awareness of and support for the positive issues involved. This will help to educate voters, civic and government leaders to accept and, in turn, make a positive decision to implement water fluoridation as a safe and effective way to reduce inequalities in health.

5.1.2 Other Public Health Measures

Fluoride Toothpaste - Fluoride toothpaste use has increased considerably in the last 30 years. In 1970 only 10% of toothpaste was fluoridated but present figures would suggest 95% of toothpaste contains fluoride. This large use of toothpaste in this formulation could be considered a public health measure which has been considered by some (Renson, 1989) to be a major cause for the recent trends for

reduction in caries. There is an increasing consensus that, as young children from deprived groups apparently still have very limited access to toothpaste, public health programmes for high caries risk groups aimed at providing daily access to fluoride from this vehicle via the well accepted route of toothbrushing should be encouraged.

Fluoride Drops and Tablets - In areas where water is not fluoridated, the administration of a tablet or drops, ***if*** used as advised, is effective in preventing dental caries in both deciduous and permanent teeth. Effectiveness of supplements is greater the earlier the child begins taking the fluoride supplements.

Driscoll (1974) summarised 21 studies of such programmes and reported consistent benefit of between 50-80% reduction expected in both dentitions if supplementation commenced at 2 years or younger. Entry into these schemes later produced less benefit. The greatest difficulty with such programmes, when viewed as a public health measure, is the inability to maintain cooperation over a period of 10 years in a large proportion of the population. A recent review of fluoride supplements concluded that they were not an effective public health measure.

Ways of increasing compliance in the pre-school age group should be reviewed and such programmes should be targeted at high caries risk individuals under the overall care of clinicians. Experience from such countries as Norway shows that tablets can be introduced successfully through 'well-baby' clinics where the proportion of young children taking supplements increased from 1% to 50% in 5 years, (Lokken and Birkeland, 1978). A consistent policy on dosage schedule should ideally be agreed, but the difficulties in this area must be recognised as there are increasing numbers of regimes recommended by different scientific organisations.

Fluoridated Salt - This route of supplying fluoride has found favour in a number of European countries, notably Switzerland, Hungary and most recently France. It is an attractive vehicle in many ways as the precedent of iodised salt is established and the aim is only to maintain medically acceptable levels of use rather than increasing consumption. The potential of using salt in this way in Scotland is worthy of further consideration.

Behavioural Changes - Oral and dental health is obviously affected by the behaviours of the children and the parents. The major areas affecting dental health of school children are:-

use of fluoride toothpaste	-	see above affecting tooth decay
dietary habits	-	high sugar intake causing dental decay
oral hygiene	-	directly related to periodontal health
dentist visiting pattern	-	related to treatment patterns of both dental decay and periodontal disease.

Diet - The diet of Scottish school children has been shown to be poor (Scottish Diet Report, 1993) high in fat and sugar, low in fruit and vegetables. This poor diet is a major contributory factor to the poor oral health seen in Scotland compared with other parts of the United Kingdom.

Problems start in early childhood with low levels of breast feeding and early weaning on high sugar products such as baby juices leading in some cases to diagnosis of rampant caries where children of 2 and 3 years of age have decay in multiple teeth. McNeil (1991) showed a high percentage (29%) of energy from sweetened foods such as confectionery, cakes and sweet drinks in a diet of Dundee schoolchildren as compared with recommended lower levels. Prevalence of caries

has been directly correlated with the amount of non-milk extrinsic sugar in the diet and health behaviours of Scottish school children. Curry (1992) showed that 2/3 of the Scottish school children sampled aged 11 to 15 years consumed sweets and sugar-containing fizzy drinks every day, with these two latter products forming an increasing proportion of the adolescent diet over the last ten years (Rugg Gunn et al, 1993).

It is important that advice on changes of the diet should take place on a population basis using mass media as well as being part of individual counselling. This advice should be an integral part of health education programmes throughout Scotland. The potential role of local food policies should be reviewed.

Toothbrushing/Oral Hygiene - Overall, toothbrushing frequency has increased considerably over the last 30 years. In the 1983 Survey of Children's Dental Health in the United Kingdom, over 96% of children in all age groups interviewed claimed to clean their teeth at least once a day or more frequently. This has apparently had an effect on periodontal disease, with less than 9% of 15 year olds in the United Kingdom demonstrating any advanced periodontal disease showing pocketing in the OPCS Report in 1993.

Toothbrushing has, therefore, become an established behaviour and consideration should be given to extending the use of this principle to the pre-school groups with once a day brushing (starting as young as possible once teeth are erupted) using a fluoride toothpaste to act as a preventive measure against dental decay.

Dental Attendance Patterns - These patterns vary with age but attendances increase throughout the primary school age to a maximum in early teenage life. Claimed 'regular' attenders have been recorded at approximately 60% of 12 year olds, however, some other reports suggest that 95% of children have attended a dentist within a period of one year. The OPCS 1983 Child Dental Health Survey showed that among 5-year-olds there was an average of 0.9 active decayed deciduous teeth among 'regular' attenders and 2.2 active decayed deciduous teeth among those who only claimed to attend the dentist when in trouble. Although this may not be a cause and effect situation, dental attendance could be an important factor in controlling dental decay if a broad spectrum of preventive measures are targeted at the individual at dental attendance. Unfortunately, one of the few studies to longitudinally validate children's attendance found that the unsatisfactory infrequent attendance patterns seen in Scottish adults seem to be well established in late adolescence (Nuttall and Davies, 1992).

5.2 Small Groups Preventive Measures

Numerous papers have evaluated various preventive measures used on small groups. The majority of these papers are based on school programmes where positive measures are targeted at groups and applied at regular intervals.

School Water Fluoridation Programme - Fluoride levels significantly above that of community fluoridation programmes (5 parts per million) have been recommended and overall improvements in caries experience range between 39.5% and 47.6%. This technique may have some potential in rural areas, however, the safety and cost of such a scheme in smaller establishments is questionable.

Fluoridated Milk - The absorption of fluoride from water and milk is similar but this vehicle has not been instituted on a community basis because of considerable logistic problems and the variability of intake. Stephen (1984) showed, in a test group in Glasgow, reductions of approximately 43% caries experienced compared to the control group.

Fluoride Tablet Schemes - In order to improve the uptake of the fluoride tablet various schemes have been introduced, usually in a primary school setting between the ages of 4-5 and 10-11 years. These type of programmes have negligible effect on the deciduous teeth of 5-year-olds and have shown varied results between 40% and 80% in permanent teeth (Stephen, 1993).

Fluoride Rinsing Programmes - These have used variable concentration of fluorides and frequency of use. Rinsing once per week or more often is likely to be more effective than less frequent rinsing. A rinsing time of 1-2 minutes appears suitable for all ages from about 5 years onwards. Rinsing is not suitable for children under this age due to concern with young groups ingesting a solution not designed for systemic use. Certain fluoride rinsing schemes have shown caries reductions of 25% to 69% (Murray et al, 1991).

5.3 Individual Programmes

Individual programmes usually divide into two major areas - self-applied fluoride preparations such as toothbrushing or rinsing and professionally applied preventive measures such as fluoride gels, fluoride varnish or fissure sealants. The benefits of fluoride toothpaste, the most widely used means of administrating fluoride, are considered to be responsible for reducing trends in caries over the last 30 years (Renson, 1989). The effectiveness of fluoride toothpaste has been shown in numerous clinical trials with a wide range of fluoride preparations.

Professionally Applied Fluoride - Topical fluoride therapy has been researched over many years and effectiveness in reducing caries has been shown to vary from 0-75% in a wide range of trials employing varying methods and designs. The agents employed include: Sodium Fluoride Solution, Stannous Fluoride Solution, Acidulated Phosphate Fluorides and Fluoride Varnishes. Fluoride gels, which were previously very popular, have largely been replaced by fluoride varnishes which are strictly for professional use only with caries reduction of between 7%-56% in deciduous teeth and 10%-75% in permanent teeth (Murray et al, 1991).

Combinations of Fluoride Therapies - Various combinations of fluoride therapies have been recommended in low fluoride areas combining fluoride tablets, varnishes, mouth rinsing and so on. Care has to be taken with this multiple prescribing and there are no papers which have identified the benefits of the various components in such regimes.

Fissure Sealants - The placement of fissure sealants has been shown to be a highly effective means of controlling caries in the occlusal fissures which have been traditionally recognised as vulnerable to dental decay (Stephen, 1985; Murray, 1989). It is recommended that such preventive measures are used in combination with fluoride regimes which would be an adjunct to the treatment and help control of smooth surface caries. The assessment of the effectiveness of fissure sealants is complex with data published which review both the effectiveness in reduction of caries and also their retention on the total surface over a period of time. One of the more recent long term studies by Simonsen (1991) over 15 years reported that in the sealed group only 31.3% were carious or restored, compared with 82.8% in the non-sealed teeth. A significant reduction in dental decay.

Many groups have tried to identify children most at risk of fissure caries and recommend fissure sealants for these targeted individuals. The British Periodontic Society in 1987 identified these groups:-

Children with special needs - fissure seal all occlusal surfaces

Children with extensive caries in primary dentition should have their permanent molar teeth sealed as they erupt

Children who have caries in one or more of their first permanent molar teeth should have their second molar teeth sealed on eruption

6 TREATMENT OF CARIES IN CHILDREN

6.1 Changing concepts of ideal treatment

There has been a change of concept in dentistry over the past 40 years. The profession has emerged from a phase when extractions for the relief of pain were the norm, through a stage when restoration of damaged teeth (to save them from extraction) was the aim, to a more preventive era. Care now aims to ensure that restorative intervention is avoided if at all possible and for as long as possible. This is in order to avoid the (now) known pitfalls associated with costly re-restoration and maintenance of fillings which have proved to be an imperfect replacement for sound tooth tissue (Elderton, 1985; Elderton et al, 1985; Elderton and Eddie, 1986; Pitts, 1991d).

Where progressive dentinal caries is present it is important for the individual patient that a 'preventive restoration' is provided in the context of secondary prevention. The filling is provided as the rehabilitation part of a preventive package which strives to modify the causative factors to prevent recurrence of decay. This is in contrast to the previous practice in which some dentists and patients regard the filling as a cure for the disease. There is a large educational task required to update the public and many members of the dental and other health professions about this change in ethos. Appropriately constructed and locally relevant distance learning programmes to GDPs (Davis et al, 1992b) have been effective (Davis et al, 1994) and should be developed further.

6.2 General dental anaesthetics in Scotland

Scotland has traditionally had high numbers of general dental anaesthetics used during the treatment of dental disease. With children, these anaesthetics were mainly for the extraction of teeth and were primarily done in the general dental services. Although major reductions have been recorded over the last two decades the present level of potentially avoidable anaesthetics still appears to be far too high. The reductions seen to date are due in part to the reduction in dental disease but also follow changes in legislation concerning operator-anaesthetists and latterly the recommendations of the working party into general anaesthesia, sedation and resuscitation in dentistry.

In order to reduce the exceptionally high incidence of general anaesthetics, especially in young children, it is considered that major behavioural changes are required in pre-school groups aimed at the diet, use of fluoride and alternative treatment therapies to extractions. Where treatment such as extractions are necessary, use of adjuncts such as inhalation sedation should be preferable to general anaesthesia.

7 COSTS AND RELATED ISSUES

In many areas of dental services we do not have sufficient information on costs to carry forward meaningful analyses. Although the current systems with priced care for adults holds out the potential for such studies, the lack of detailed treatment information for children is a major barrier. There is some information about preventive programmes.

Murray has shown that cost-effectiveness decreases as one moves from water fluoridation to school programmes to individual measures. Similarly, self application is less expensive than ancillary treatment and then in turn professional application by a dentist. There is undoubted evidence that overall, the most cost-effective fluoride therapy is that of water fluoridation, especially in comparison to other methods. However, given the lack of progress on this issue in Scotland, other strategies have to be considered.

In general terms the cost-effectiveness of various methods of prevention increase with the size of the target population. However, targeting of these types of treatments if undertaken effectively can reduce 'wasted treatment' on people who would not have succumbed to disease and increase the cost-effectiveness of these procedures. Accurate caries risk classification is still problematic and the most effective means of targeting may be on an individual basis, following an assessment by a dental surgeon who can then decide on a regime which is directly related to the risk to that child. The use of fluoride toothpaste with targeted groups has already been discussed and represents another potentially cost-effective strand.

In addition to preventive adjuncts (such as fluoride) or clinical treatments (such as fissure sealants), the other major public health approach has been health education and the encouragement and facilitation of behavioural change. These type of programmes either alone or in conjunction with clinical preventive strategies have traditionally been difficult to evaluate. The cost-effectiveness of some of these programmes and campaigns to change health related behaviour is, in terms of changes in disease state, rather unsatisfactory although changes in attitude and behaviour have been demonstrated.

8 STRATEGIES FOR THE FUTURE

In the present situation, when much of the framework for progress will depend upon the Government response to the "Bloomfield" report on remuneration systems in the GDS and with an Oral Health Strategy for Scotland to be published this year, it is possibly counter-productive to outline specific strategies which might rapidly be overtaken by events in the National Health Service.

However, the Dental Caries in Children SNAP Group were able, on the basis of what has been set out above, to make a series of recommendations which we feel are important and relevant whatever the detail of the new developments and responses may be. These recommendations appear in section 9 of the Executive Summary. The next task will be to review these after an appropriate interval.

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