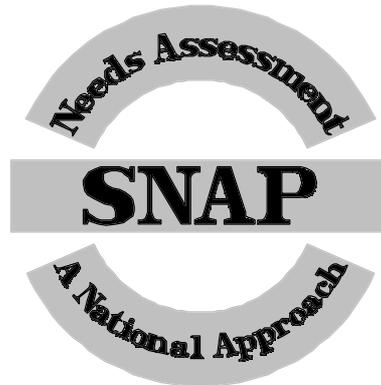


Scottish Needs Assessment Programme



ADULT ORAL HEALTH

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Scottish Needs Assessment Programme

Oral Health Network

ADULT ORAL HEALTH

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Appendix 1 Glossary of terms

EXECUTIVE SUMMARY

STATEMENT OF THE PROBLEM

Most, if not all, of the Scottish population experience some form of oral disease in the course of their lifetime. The most common conditions, dental caries and periodontal (gum) disease, are to a large extent preventable, this being dependent however on the adoption of health promoting behaviours. The level of dental health in Scotland is poorer than in England and Wales with approximately one in five Scottish individuals over the age of 16 years having lost all their natural teeth, and almost all of the remainder having some form of gum disease. This is exaggerated by the fact that only a small proportion of the population is registered with the dentist on a continuous basis. Within Scotland, variations in oral health are found in different communities. These differences are related to levels of deprivation.

1. **The Individual**

Oral Health is directly related to an individual's attitude and behaviour, being affected by diet, toothbrushing habits and dental attendance patterns. Smoking can also influence the development and progression of oral diseases, in particular, periodontitis and oral cancer. The latter condition is also associated with high alcohol intake.

Behaviours to promote dental health include consuming a healthy diet low in refined sugars, limiting the frequency of intake of such sugars, brushing the teeth with a fluoride containing dentifrice and attending for dental check-ups.

At present, there is little consultation with the public on dental issues. Consequently efforts should be made to improve communication links and to identify the needs and wishes of the public and ensure that appropriate access to dental services is provided.

2. **Provision of Dental Services for Adults**

At present, approximately half of the adult Scottish population is registered with a dentist at any point in time. The number registered on a continuous basis is, however, very much lower. Most adults receive their treatment from the General Dental Service, with the Community Dental Service providing complementary care.

A referral system to secondary care exists for those requiring specialist treatment. The provision of both primary and secondary care dental services is not uniform across the country and, in recent years, there has been an increase in the provision of dental services under private arrangements.

3. **Economic Issues in Adult Oral Health**

The extent of the application of health economics to dentistry has been limited mainly to dental caries. Recently, the programme budgeting and marginal analysis (PBMA) approach has been put forward as a means of covering the economic evaluation of all aspects of dental care requirements.

4. Recommendations

Given the constraints of an Executive Summary and the breadth of this topic, only the main recommendations are listed below. The full complement of recommendations is contained within the report, at the end of appropriate sub-sections.

Dental health behaviour and attitudes

More work is required to identify reasons for dentally-related behaviour and attitudes, and to elucidate means by which they may be influenced.

Health Promotion and Consumer Issues

There is a need to review oral health promotion in Scotland and to have a strategic approach which addresses the socio-environmental and lifestyle issues.

Recognition should also be given to the involvement and influence (both positive and negative) of Commercial Companies.

Dental Caries

The promotion of water fluoridation should continue, and the importance of healthy diets, regular toothbrushing and dental attendance should be stressed.

Research is required to investigate factors influencing decision-making relating to the replacement of restorations (fillings).

There is a need to develop further epidemiological work associated with adult dental health and disease.

Periodontal Disease

The importance of the prevention and early diagnosis of periodontal disease requires to be highlighted, and there is a need to ensure that appropriate treatment is given, both in primary and secondary care. This may require changes to the general dental practitioner contract.

Extracted and Missing Teeth

Further information should be collected on reasons for dental extractions, and public awareness should be raised regarding the treatment options available for missing teeth.

Oral Cancer

There is a need to increase public awareness of the existing signs and symptoms of oral cancer, and to encourage regular dental check-ups to promote the detection of early lesions. There is also a need to provide continuing education for all health professionals on the detection and prevention of oral cancer.

Other soft tissues disorders affecting the Oral Cavity

There is a need to raise the awareness of general medical practitioners and pharmacists of some of these conditions and to develop appropriate referral systems.

Oro-facial Pain

Further information is required to determine the prevalence of various types of oro-facial pain, and there is a need for continuing education concerning the management of these conditions.

Toothwear

Further research is required to determine the incidence, prevalence and appropriate management of

toothwear. There is also a need to increase public awareness concerning the risks of dental erosion.

Dental Alveolar Injuries

Studies are required to assess the prevalence of such injuries and to determine appropriate levels of service provision. Efforts should be made to raise public awareness concerning preventive measures.

Provision of Services

Further research is required to investigate alternative models of primary dental care delivery, and prevention in primary care services should be emphasised.

There should be adequate provision of dental services regardless of whether people are in community, in residential, or in hospital care.

There should be more opportunities for dentists to work with other health professionals to maximise health gain.

Research is required to determine methods of improving dental attendance levels and to enable actual, rather than claimed, attendance patterns to be established more accurately.

Appropriate levels of secondary care services should be available to populations throughout Scotland.

Economics

Further research is required to determine the social and economic impact of poor dental health amongst individuals and groups.

Research is required to assess the relative efficiency of different strategies relating to the treatment and prevention of dental caries and periodontal disease.

Work requires to be conducted to determine the appropriate levels of provision and distribution of dental specialists across Scotland.

There is also a need to evaluate health promotion strategies.

INTRODUCTION

This report is intended to provide an overview of the main issues affecting adult oral health, to highlight particular areas of concern and to make recommendations for future research and service provision. The most prevalent dental diseases are addressed as are the requirements of certain population groups and factors influencing behaviour towards dental health.

Dental disease is a major public health issue affecting three quarters of the population by the age of fourteen. As a result, much of the adult dental services provision is spent treating dental decay which has manifested itself in childhood. The report therefore draws attention to preventive measures which, although primarily affecting children, also impact greatly on adult oral health.

Each disease/disorder category is analysed under the headings of epidemiology, prevention and health promotion, diagnosis and assessment, and treatment and continuing care, as appropriate. The provision of services is also addressed and account is taken of behavioural aspects influencing attitudes towards oral health.

As several of the topics covered would be worthy of an individual SNAP report this document, limited by the constraints of the SNAP programme, gives direction to service planners for future work in relation to dental issues. Many of the recommendations therefore relate to areas of research, but it is necessary to emphasise the need to continue adequate levels of accessible dental services in the meantime.

The Government's plans for the future of the general and community dental services are awaited, and may influence the recommendations within this report.

1. DENTAL HEALTH BEHAVIOUR AND ATTITUDES

The most common dental diseases are decay and gum conditions, both of which are almost totally preventable. Their prevention however depends on the behaviour of individuals and on their attitude towards dental health and these in turn appear to be influenced by social factors.

Commonly used measurements of social factors are those of social economic status and deprivation and these are related significantly to dental health. This suggests that major health gains could be made through interventions at the societal level. As it is more difficult to change society than it is to affect behaviour it is appropriate also to examine the scope for health gain through behavioural change.

The Scientific Basis of Dental Health Education, A Policy Document (Levine 1993) identifies 3 behaviours which are proven to have an impact on oral health.

- (1) Plaque removal by the patient.
- (2) Dietary control, principally frequency of sugar intake.
- (3) Going for dental check-ups.

In the Dental Health Services Research Unit longitudinal study of a representative sample of Scottish adults who have some of their own teeth, only 2% consistently managed to attend for dental care within 12 months of a previous course of treatment and only 16% kept up a pattern of attendance in which they visited within 24 months of each previous appointment (Nuttall & Davies, 1991). This can be contrasted with findings reported in the national surveys that 50% of Scots claim to go to a dentist for regular dental check-ups (Todd and Lader 1991). This pattern of attendance demonstrates that when reviewing Dental Practice Board returns the key figure to judge continuity of care is the proportion of continuing care contracts which are successfully rolled on, rather than the number of people registered at any given time as many may register for continuing care but fail to re-new the contract within the two years allowed. The three health behaviours detailed above appear to be related to each other, for example people who go to a dentist for check-ups also tend to claim to use more items to clean their teeth. It can therefore be useful to try to identify common factors (e.g. attitudes) which seem to be associated with "good" health behaviour. Behaviour has been related to whether the patient feels they can carry out actions which would benefit their care and also, to whom the patient feels is in control of their medical condition. They may feel that it is themselves, the clinician or "fate". In addition, in dentistry, other measures such as compliance with oral care instructions (Camner Sandell & Sarhed, 1994), a person's dental anxiety or fear (Schuurs & Hogstraten, 1993) and the newly developed measure of dental indifference (lack of concern about oral health) (Nuttall, 1996) have also been used. Dental fear and apathy and lack of concern appear to be the principal self reported reasons for avoiding going for dental check-ups (Todd, Walker & Dodd, 1982).

The role of psychometric tests in the clinical practice of dentistry has not been developed particularly well but three possibilities exist for their use.

- (1) for establishing the characteristics of individual patients in a clinical setting;
- (2) for identifying groups who have special treatment/management needs;
- (3) for identifying groups for targeted health promotion programmes.

There is little evidence to suggest that the issuing of forms to patients on an individual basis would be of much benefit as clinicians can be at least as accurate as psychometric tests in classifying a patient. There is a role, however, for such tests when working with groups who have special treatment or management needs, e.g. the dentally anxious, for considering what those needs might be and for identifying groups for targeting oral health promotion programmes, e.g. the dentally indifferent.

Recommendations

- 1.1 Further research is required to be able to differentiate between the "indifferent" and "anxious" patient (see glossary of terms).

- 1.2 The extent of health gain possible through the promotion of behavioural change requires assessment.
- 1.3 The dentally anxious or fearful should be considered as special need groups who may require special clinical and general management. Their needs and wishes in respect of what they want from dentistry requires particular consideration.
- 1.4 The needs of patients who consider their dental health as a low priority requires to be assessed and evaluated to explore ways in which their needs can be met.

2. HEALTH PROMOTION AND CONSUMER ISSUES

2.1 Health Promotion

Health Promotion has been defined as the process of enabling people to increase control over and improve their health (W.H.O. 1984). It has been given greater emphasis in recent years as a result of changes within the NHS.

Health Promotion focuses on determinants of health, both socio-economic and environmental factors plus individual health-related behaviour, and seeks to avoid a victim blaming approach, and to make the healthy choices the easy choices. This involves many sectors including education departments, health services, social services, voluntary organisations and the workplace.

Commercial companies have much influence on the population as a whole through provision of goods, establishing habits and marketing products.

A common risk factor approach (CRFA) is recommended (Sheiham 1995). For Oral Health Promotion, this involves the following factors: diet, alcohol, smoking, accident prevention, personal hygiene and use of services.

Sheiham and Plamping (1988) recognised the need for a strategic approach based on local needs with clearly defined aims and objectives and methods of evaluation. Programmes nationally and locally are increasingly organised using the key groups and key settings approach, e.g. Workplace, NHS, Schools, Community, Voluntary Organisations (HEBS, 1992).

2.2 Oral Health Promotion

Dental and Oral Health is a first order priority in Scotland (SOHHD, 1991) and the Scottish Strategy for Oral Health has been published (SODH, 1995).

The Scottish Oral Health targets are that 60% of school entrants should be caries free by the year 2000, and that less than 10% of 45 - 54 year olds should be edentulous. The average number of decayed missing and filled teeth for 12 year olds should be no more than 1.5 by the year 2005, 90% of 18 year olds should have all their teeth by the year 2008 and 80% of 35-44 year olds should have at least 21 teeth by the year 2005.

Other morbidity, mortality, dietary and behavioural targets also relevant to oral health are a reduction of 15% in mortality from cancer in those aged over 65 years, a reduction in the number of smokers in the age range 12 - 24 by 30%, a reduction in the number of smokers between 25 and 65 by 20%, a reduction of 20% over 1986 levels in the proportion of the population exceeding the recommended sensible limits of alcohol consumption, reduction in sugars as percentage of energy from 19% to less than 10%, a reduction of intake by half of cakes, biscuits and pastry intake to reduce by half, intake of sugar and preserves, a reduction by half of intake of confectionery and a reduction by one third of soft drinks (SOHHD, 1993).

Information on funding for oral health promotion programmes was requested from the health boards and from Community Dental Service providers but the data was not available in all cases and its comparability is in doubt.

Since the publication of Scotland's Health: A Challenge To Us All, oral health programmes have been developed by Health Boards. Two Health Promotion Departments (Greater Glasgow and Lanarkshire) have also funded Oral Health Promotion Officers.

An additional difficulty in identifying specifically allocated oral health promotion related funding occurs with the

use of the common risk factor approach for health promotion programmes, e.g. diet, smoking and alcohol.

2.3 Consumer Issues

'Working for Patients' (1989), 'Framework for Action' (1991) and the 'Patients Charter' (1991) emphasised the need to take into account consumer views. Research of the literature shows limited published data on the subject but personal communication indicates that research is being carried out on an ad hoc basis to varying degrees across the country.

Mechanisms for improving communication between service planners, providers and consumers include user surveys, patient supporters, complaints procedures and codes of openness.

Recommendations

- 2.1** A review of oral health education in Scotland is required to identify content, methods, materials and methods of evaluation; areas of good practice; needs for further development and research; the use of common risk factor approach and the use of a settings approach.
- 2.2** The development of oral health education theory and practice should involve a behavioural and lifeskills/ health skills approach.
- 2.3** Oral health promotion development should address both environmental and lifestyle issues.
- 2.4** A strategic approach to oral health promotion should be adopted, based on local needs with clearly identified aims, objectives and methods of evaluation.
- 2.5** Action should be taken to encourage commercial companies to recognise their influence over the oral health of the population.
- 2.6** There should be a combined community and targeting approach to health promotion.

3. ADULT ORAL HEALTH

3.1 DENTAL CARIES

Epidemiology

Dental caries (tooth decay) is an extremely prevalent but preventable multi-factorial disease associated with morbidity and high costs. Much of the epidemiology data come from the Adult Dental Health Surveys which are conducted on a United Kingdom wide basis every ten years by the Office of Population Censuses and Surveys (OPCS). Scotland has been included in the last two surveys, i.e. 1978 and 1988, but the initial survey in Scotland was carried out in 1972. Information relating to Scotland is presented in the UK surveys at national level, since the sample sizes are insufficient to allow breakdown of the data at Health Board level.

The percentage of people with 18 or more sound and untreated teeth is used commonly as an indicator of dental health.

The results of the OPCS surveys (Todd & Lader, 1991) show that between 1972 and 1988, there was a slight increase in the proportion of Scottish dentate adults with at least 18 sound and untreated teeth (23% to 26%). The improvement in Scotland was most marked in the 16-24 year-old age group, where the proportion of individuals with 18 or more sound and untreated teeth increased from 41% in 1972 to 64% in 1988.

In 1972, for Scotland as a whole, men had better teeth than women with 29% of men having at least 18 sound and untreated teeth compared to 15% of women. However, by 1988, the difference had been reduced to two percentage points with corresponding values of 27% and 25%, respectively. The average number of decayed or unsound teeth among men had decreased from 2.8 in 1972 to 1.4 (1988), and a similar trend occurred in females, with a decrease from 2.1 teeth in 1972 to 1.0 in 1988.

The OPCS surveys have examined the relationship between social class and tooth status, and have found higher numbers of sound and untreated teeth among those from higher social classes, and higher numbers of decayed and unsound teeth among those with a manual background.

Over the period 1978 to 1988 a fall in the average number of filled teeth occurred amongst regular attenders, whilst an increase occurred amongst those who attended only when in trouble. Women have, on average, more filled teeth than men, and fewer fillings are found amongst people allocated to social classes IV and V.

In 1988, the mean number of perfect teeth was the same (12.8) amongst regular dental attenders and those who attended only when in trouble, but there was a difference when the numbers of imperfect (decayed or filled) teeth were examined. Not surprisingly, regular attenders had, on average, more filled teeth than irregular attenders, 11.3 and 5.7, respectively.

As people get older gum recession may cause a part of the root to be exposed to the oral cavity and provides an additional surface where decay can become a problem particularly as root dentine decays more easily than does crown enamel. With a higher proportion of adults retaining their teeth for longer periods of time (see section 3.3), it has been hypothesised that the prevalence of root caries will increase.

Assessment of root surfaces was included in the OPCS dental examination for the first time in 1988, and the results provided a baseline measurement for future monitoring. The data were presented for the UK as a whole and showed that two thirds of adults had some root surfaces exposed. Not surprisingly, root surface problems were correlated highly with age. Social class, dental attendance pattern and sex showed no significant association. For all dentate adults, the average number of teeth with exposed root surfaces was 5.3. Most of these surfaces were sound but, on average, 0.5 teeth had a filled root surface and 0.3 teeth had root caries.

Overall, the epidemiological data in relation to caries in Scottish adults showed a modest improvement in dental health status between 1978 and 1988. However, the levels of disease found in the latest survey were higher than in England and Wales for every age category, and in many cases, the Scottish figures from the 1988 survey were still worse than those seen ten years earlier for the UK as a whole.

Prevention and Health Promotion

The benefits of water fluoridation in relation to caries prevention in children has been described in the SNAP Report on Dental Caries in Children. It is now recognised widely that such benefits are not limited to childhood but last throughout adult life. However, at present, no water fluoridation scheme exists in Scotland, and while Health Boards should continue to promote the concept, other public health measures should continue to be adopted and reviewed in an attempt to improve the dental health of adults.

The most important of these is the promotion of initiatives aimed at influencing the attitudes of adults in relation to their teeth, since the development of dental caries is very much influenced by behaviour. The main actions to be promoted are:

- 1) consuming a healthy diet low in non-milk extrinsic sugars (see glossary of terms) and restricting sugar intake to meal times
- 2) tooth brushing using a fluoridated dentifrice
- 3) regular dental attendance

The benefits to be obtained from these actions have been discussed in detail in the SNAP Report on Dental Caries in Children and are also relevant to the adult population.

Diagnosis and Assessment

In its early stages, dental caries is treated easily but the condition is not apparent to the patient. It can be diagnosed by a dentist and thus regular dental check-ups are useful.

A high proportion of the caries found on the crowns of teeth in adults is recurrent caries, occurring around the margins of previously-placed restorations. Such lesions, together with those occurring de novo, are usually detected by means of radiographs or by visual inspection.

The prevalence of root caries increases with age and is associated with exposure of root surfaces, usually as a consequence of receding gums. Dependent on the site of the lesion, visual examination and/or radiographs are used to detect the caries, and tactile examination may be performed in an attempt to distinguish between an active and inactive root caries.

Dental practitioners will detect and plan care for a range of lesion sizes, from the early lesion, (limited to the outer surface of the crown or root surface) to the much more extensive lesion, extending through the dentine and affecting the pulp of the tooth.

Treatment and Continuing Care

A change in treatment philosophy has occurred over the last few decades and this is apparent from the results of epidemiological surveys. During this period there had been a progressive change in the treatment of dental caries, from a stage where tooth extraction was the most common method of relieving pain, through a restorative phase, to a more preventive-orientated approach to tooth care.

The type of treatment carried out will be influenced by the extent of caries, thus emphasising the importance of preventive dental check-ups, so that lesions may be detected at an early stage. Preventive therapy alone is appropriate only for early lesions affecting the outer surfaces of the tooth. Most dentinal carious lesions in adults are treated by the placement of restorations such as fillings or crowns, while more advanced lesions may also necessitate root treatment or, in some cases, extraction of the tooth. Where this latter procedure is carried out, further treatment such as the provision of dentures or bridgework, may be required.

In addition to the clinical condition of the tooth, treatment-type will also be influenced by the patient's attitudes to their dental health, and by their general health status.

Longitudinal studies involving a representative sample of the Scottish dentate adult population have shown that 66.5% of all tooth surfaces for which fillings are undertaken have previously been filled (Elderton & Davies, 1984). Another study suggests that 36% of replacement fillings are to treat recurrent caries, 19% are undertaken because recurrent caries is suspected but not positively identified and 36% amount to restorative treatment need in the absence of disease (Nuttall et al, 1987). Broadly similar findings have been reported from a number of other areas across the world (Kidd et al, 1992). The main components of this treatment need are the repair of fillings and heavily restored teeth which have fractured. Taken together, the findings suggest that about a quarter of fillings undertaken for the adult population amount to repair and maintenance of the dentition as a result of earlier attempted restorations.

Despite being a major area of dental treatment need, the requirement for repair work is not assessed in the major UK dental surveys of adult dental health, and has a tendency to become a neglected area of interest. The process whereby fillings are replaced by crowns as the tooth structure eventually breaks down has been described by Elderton as the *restorative cycle*. It is a problem which emphasises a) the need to be circumspect about the initial placement of a restoration, b) minimal cavity preparation when placing a restoration and c) the need for effective caries prevention for children in order to try to prevent the *restorative cycle* from beginning.

In most instances the treatment of caries in adults is carried out by general dental practitioners. However, complex cases may require input from specialists in restorative dentistry.

In 1994-95 fillings, root canal treatments and crowns accounted for 22%, 5% and 17%, respectively of the total cost of all items of treatment in the GDS in Scotland. Over 2.6 million such treatments were performed at a cost of over £45 million (Scottish Dental Practice Board).

Recommendations

- 3.1.1** As the most effective caries preventive measure, the fluoridation of water supplies should continue to be promoted.
- 3.1.2** Health behaviours which are known to influence dental health should be positively promoted. These include - consuming a healthy diet low in non-milk extrinsic sugars (see Appendix I for glossary of terms) and limiting the frequency of intake of refined sugars; attending for dental check-ups; and effective removal of plaque by brushing with a fluoride dentifrice.

- 3.1.3** The OPCS Adult Dental Health Survey which provide data at national level every ten years should continue. To supplement these data and provide information on caries at health board level, further development of appropriate survey protocols is required in particular, in relation to 18 year olds.
- 3.1.4** The distribution of caries in the population is skewed. Efforts must be made to identify those at high risk of developing dental disease with a view to enabling them to reduce this risk.
- 3.1.5** Regular dental check-ups at a frequency which a patient's dentist considers to be appropriate for their dental health should be promoted.
- 3.1.6** In order to increase the proportion attending for preventive dental check-ups, or early detection of dental disease, research should be carried out into the social and economic factors affecting the use of preventive dentistry.
- 3.1.7** Further research is required to ascertain the factors affecting the longevity of restorations.
- 3.1.8** Further research is required to assess the need to reduce repair and maintenance treatment. It is recommended that a target be developed to extend the average longevity of restorations, e.g. by clinical audit. This should be looked at by various agencies for instance the Scottish Dental Practice Board and CRAG.

3.2 PERIODONTAL DISEASE

Periodontal disease affects the tissue surrounding the tooth attaching it to the bone. Extensive disease can cause loss of bone, loss of supporting tissue and can result in tooth loss.

Epidemiology

The 1988 OPCS Adult Dental Health Survey found that 96% of dentate adults in Scotland had one or more of the periodontally related conditions included in the survey (bleeding gums, calculus or periodontal pockets). Of dentate adults 79% had some evidence of bleeding gums and 75% had periodontal pocketing with 8% having at least one deep pocket. The youngest age group, 16-24 years, were most likely to be disease-free but even in this age group only 12% overall had healthy gums. Regular dental attenders were not very different from those who only attended when having trouble. Overall 11.7 teeth per dentate adult were recorded as having bleeding gums, calculus or pockets or a combination of these conditions. The average number of teeth with healthy gums decreases with age from 17.7 among dentate 16-24 year olds to 5.1 in those over 65 years. The groups most likely to have deep pockets were those who cleaned their teeth less than once a day (19%) and those dentate adults who had not visited a dentist for over 10 years (23%).

There is a lack of studies on the progression of chronic gingivitis which can start in childhood and may give way to periodontitis in adolescence and adulthood. In Sweden (Hugoson 1981) limited studies have been carried out showing a third of three year olds, two thirds of 5 year olds and three quarters of 15 year olds were affected.

In a five year longitudinal study of 167 British adolescents (Clerehugh et al 1990), the prevalence of bone loss increased from 3% at 14 years, through 37% at 16 years, to 77% at 19 years. The proportion of sites with bone loss increased from less than 1% at 14 years, through 7% at 16 years, to 31% at 19 years of age. The prevalence of chronic periodontitis in teenage populations is uncertain due to a lack of uniformity and stringency of diagnostic criteria. There is wide agreement that large amounts of periodontal destruction are unusual, but minor amounts may be quite common.

There is insufficient information to explain fully the variability and severity of periodontal disease within and between individuals.

Bacterial plaque is the primary aetiological factor in periodontal disease. At the present time additional risk factors are known to include age, tobacco use, diabetes mellitus, HIV infection, certain racial, gender and other inherited predispositions and a range of systemic diseases and drug therapies. Oral hygiene is the principal determinant of periodontal status but it is also affected by the susceptibility of the patients to progress from a mild form of the disease to an advanced state. Oral hygiene levels are associated with the patients' socio-economic

status and cultural habits.

Caution must be exercised in interpreting the results of epidemiological studies since a much higher prevalence of periodontitis in older individuals could be overlooked by failure to account for the periodontal conditions of missing teeth. However estimation of the population subfractions for which periodontal disease is a serious oral health problem has resulted in frequencies not exceeding 10-20%, which vary among geographically, ethnically and racially different populations.

However, this is not to say that 80-90% of the population will have no need of periodontal treatment. They will be at less risk of losing significant numbers of teeth but may experience various symptoms of periodontal disease. Additionally account has to be taken of their desire to have healthy mouths. It should also be noted that more successful retention of a natural dentition in older age groups is likely to result in an increased prevalence of periodontal disease in the population at large with a concomitant need for periodontal therapy as the prevalence of edentulousness falls.

Probably the most important challenge that periodontal epidemiology has to face is the identification of risk factors for disease progression. Such knowledge will in turn facilitate (1) the identification of those individuals for whom periodontal disease will become a serious oral health problem, prior to the development of irreversible periodontal damage, and (2) the application of effective measures for prevention.

Caution has to be exercised when prevalence rates from longitudinal studies are interpreted. While it is true that a rather small number of tooth sites and relatively few subjects appear to undergo substantial loss of periodontal tissue support, it should be remembered that (1) even the long-term studies are of relatively short duration in relation to the average life-span to which the dentition is at risk of periodontal deterioration, and (2) subject drop-out, tooth loss and therapeutic intervention result in underestimation of the true incidence. Hence, while it is correct that gingivitis does not necessarily convert to destructive periodontal disease, it would be improper to overlook the apparent risk for such an event.

Prevention and Health Promotion

The control of dental plaque, i.e. by effective tooth cleaning, is essential for the prevention and control of periodontal disease. Dental health education (DHE) to improve the effectiveness of plaque removal is the main approach, and individual self-care is, at present, the only rational long-term method to control plaque.

The aim is to improve oral hygiene performance so that individuals achieve levels of plaque which lead to rates of periodontal destruction compatible with a functional and socially acceptable natural dentition for life. Some deterioration in the periodontal condition is acceptable if it does not affect the social, psychological or functional needs of the individual. In adults it is considered more practical to aim to reduce the progression of disease rather than attempt to eliminate all signs of gingival and periodontal disease. This may require a certain amount of periodontal treatment and secondary prevention as discussed previously. It has been shown in Sweden that considerable reduction in need for restorative intervention has been possible in association with regular professional cleaning provided to control and maintain periodontal conditions (Axelsson & Lindhe 1981).

Dental auxiliaries could provide dental health education in locations other than dental surgeries but research is required to determine an appropriate skill-mix, demonstrate the clinical effectiveness, and assess cost-effectiveness.

Diagnosis and Assessment

Diagnosis is dependent on the identification of loss of supporting tissue, primarily by clinical examination with a periodontal probe. Clinical examination may be supplemented by radiographic examination. Bleeding on probing is currently the only available clinical sign of active disease. Whether disease activity identified in this way is associated with progressive loss of supporting tissue can only be decided retrospectively. Patients and teeth at particular risk cannot yet be identified prospectively, except in the general terms described under risk factors.

With the exception of localised juvenile periodontitis, the various forms of chronic periodontitis are characterised poorly. The time-lapse between onset and diagnosis may be unknown, different diagnoses may be appropriate for different teeth in one mouth, and the influence of concurrent systemic disease may be difficult to assess. Failure to make a definitive diagnosis should not, however, prove to be a barrier to therapy, since all forms of

chronic periodontitis share a common approach to treatment at the present time although prognosis may vary.

Periodontal assessment should be a fundamental part of dental care in the primary care setting, so that patients can be informed of, and given advice about the management of periodontal disease. There is evidence to suggest that the extent to which this responsibility is acknowledged is extremely variable, as it would appear that many patients referred with periodontal disease report that they have never been counselled with regard to their periodontal condition. The vast majority of the expenditure on periodontal treatment in the general dental service is related only to simple scaling and polishing. The £12 million spent annually on the treatment of periodontal disease in general practice may be spent more appropriately on different forms of periodontal treatment.

Treatment & Continuing Care

Periodontal treatment may be aimed at restoring periodontal health, or at merely controlling symptoms such as bleeding gums, bad breath or discomfort.

It has been established that treatment of periodontal disease by methods which emphasise the removal of the main causative agent, bacterial plaque, can be successful in restoring periodontal health and reducing the rate of disease progression by a factor of 20 to 30 times (Lindhe & Nyman 1984). The success is dependent, however, on a large measure of patient compliance with tooth cleaning measures on a daily basis at home. Professional treatment methods include scaling and root planing, surgery to improve access for root planing and reduce pockets, and a number of forms of drug therapy which are generally used much less frequently and only in special situations. These methods are all dependent for success on good home care and effective recall maintenance. Unfortunately, good compliance is not predictable even in those patients with obvious disease and who claim to be well motivated to keep their teeth. Behavioural aspects of the management of patients with periodontal disease require further investigation.

The treatment of mild and moderate forms of periodontal disease should be within the scope of primary care. This may be facilitated by the availability of access to advice from the hospital consultant service in periodontology or restorative dentistry. The treatment of more advanced forms of periodontal disease, especially if complicated by other dental problems, will usually require access to specialist treatment. At present, access to advice and specialist treatment is limited geographically to those patients who may be prepared to accept referral to a dental hospital, or a hospital dental department, with input from a consultant in restorative dentistry.

It should be appreciated that the success of various other forms of dental treatment may be compromised by failure to diagnose and treat periodontal disease. Various technical procedures, such as tooth preparation for fillings or crowns and the taking of impressions for crowns and partial dentures, will be facilitated if gingival tissues are healthy. Proper management of periodontal tissues is, therefore, an integral part of restorative dentistry.

Recommendations

- 3.2.1** Greater emphasis should be placed on the importance of prevention and early diagnosis of periodontal disease in the primary care setting.
- 3.2.2** The potential benefits of making administrative and fiscal arrangements to facilitate the treatment of early to moderate forms of periodontal disease in the primary care setting should be investigated.
- 3.2.3** Patients with moderate to advanced forms of periodontal disease should be assessed and advice given to the referring dentist or appropriate specialist treatment offered to the patient.
- 3.2.4** Clinical guidelines for the management and treatment of adults affected by periodontal disease should be developed.
- 3.2.5** Administrative arrangements should be developed to allow patients whose periodontal disease has been treated by a specialist, to be seen by their general dental practitioner, and/or dental hygienist, at intervals appropriate to their maintenance requirement.

3.3 EXTRACTED AND MISSING TEETH

Epidemiology

Much of the information collected in adult surveys relates to levels of tooth loss among different groups of the adult population. In 1988, 74% of adults in Scotland had some natural teeth. This was a marked improvement on 1978 and 1972 when 39% and 56%, respectively, were edentulous. In 1988, while a very low proportion of those under 45 years of age had lost all their teeth, one third of the 45-54 age group and approximately half of those between 55 and 64 were edentulous. Therefore, whilst recent trends suggest that the overall level of edentulousness will continue to fall, relatively high levels of complete tooth loss will continue to be seen in some age cohorts as a consequence of earlier treatment involving tooth extractions.

The aesthetic impact of lost or missing teeth is subjective and influenced by cultural, personal and peer factors. A rising expectation among the public towards retaining teeth, aesthetics and function may increase demand for replacement of missing dental units. Tooth loss and its sequelae can impact on the individual in several ways including, concern over personal appearance, self-esteem, discomfort, loss of function and the cost of restorative or prosthetic replacement. The impact on the community is also considerable in terms of the costs involved in the replacement of missing teeth.

Teeth may be lost or missing for a variety of reasons. They may be extracted due to caries or periodontal disease or, in some cases, prior to radiotherapy or prosthetic treatment. Teeth may also be lost or extracted as a result of trauma, may be congenitally absent or may result from the patient opting for extraction rather than wanting the tooth restored.

The evidence indicates that at all ages throughout life, more teeth are lost through caries than through other disease processes. On a population basis, dental decay accounts for between 43% and 63% of total tooth loss (Oliver and Brown 1993). Periodontal disease, however, becomes a more significant factor in patients over 40 years of age (Kay & Blinkhorn 1986 and 1987).

Dentists' reasons for extractions reflect a combination of their own attitudes, their diagnostic thresholds for caries and periodontal disease, their practice circumstances, possibly the fee structure for different treatment options, as well as the patient's attitudes to tooth loss/retention (Agerholm & Sidi 1988). Length of time since qualification has been shown to have a bearing on extraction among dentists in Scotland and 48% of adults in a Scottish survey preferred to have painful molar teeth extracted rather than restored (Nuttall 1984). The act of extractions accounts for the majority of the 25,000 general anaesthetics carried out annually in general dental practice.

A follow-up of the 1972 Scottish Adult Dental Health Survey found that 40% of teeth extracted from people who became edentulous within 12 months of the survey had been considered as sound or restorable by the survey examiner (Todd and Whitworth 1972).

Extraction rates, therefore, are not necessarily related solely to disease prevalence or severity, but may be influenced by both dentists' and patients' attitudes and preferences, and overall treatment planning philosophies.

Prevention and Health Promotion

Rising expectations among the public regarding retaining their natural teeth for life and changes in treatment patterns may help reduce the prevalence of tooth loss. Education of dentists and the public and the development of clinical guidelines may help reduce the variability in treatment decisions and thresholds which pertain at the moment.

Treatment and Continuing Care

In 1994/95 a total of 498, 417 extractions were undertaken in the Scottish GDS at a total cost of just over ,3.2 million. This represents 3% of the total cost of all items of treatment. An additional 32,843 surgical extractions were performed but the proportion of these which were third molars (wisdom teeth) and extracted because of impaction or overeruption is not known. The majority of extractions (405,717) were carried out on people over 18 years of age. Of all teeth extracted, 16,640 (3.3%) were removed on occasional (emergency) visits from non-registered patients.

Within the CDS 19,790 permanent teeth were extracted during 1994 but a higher proportion of these were

performed on children a proportion of which will be for orthodontic treatment.

Replacement of missing teeth can include bridge-work, partial or complete dentures, endosseous implants or a combination of these options.

Individual treatment plans for the artificial replacement of missing teeth are influenced by many factors. These include:

- the number and location of missing teeth
- dentist's clinical judgement and experience
- dentist's practice circumstances and degree of specialisation
- financial status of fee-paying patients in the GDS
- patient expectation

In 1994/95 the GDS placed 16,016 bridge pontics at a cost of over £2.6 million and a further 159,570 dentures were provided to replace missing teeth, at a cost of just over £15.7 million. This represents 15% of the total cost of all items of treatment (Scottish Dental Practice Board 1995).

Recommendations

3.3.1 Develop and conduct research to document accurately reasons for extraction in the primary and secondary care settings.

3.3.2 Continue to raise public awareness of treatment options available regarding lost or missing teeth.

3.4 ORAL CANCER

A SNAP Report has recently been published dealing exclusively with oral cancers. Detailed below is a brief description of the epidemiology and prevention and treatment modalities associated with these diseases.

Epidemiology

At present, the incidence rates per annum for cancers in and around the oral cavity in Scotland are approximately 9.0 and 4.0 per 100,000 for males and females, respectively, with 500 new cases being diagnosed and about 230 deaths occurring from these diseases each year. The incidence and mortality rates for Scotland are higher than in England and Wales. Since the early 1970s, the incidence and mortality rates for some intra-oral cancers have been increasing, and while approximately 85% of new cases occur in individuals aged over 50 years, the trend of increasing prevalence has been most apparent in younger age groups. Oral cancer is twice as common in men and death from the disease is three times greater in Social Class V than in Social Class 1.

Prevention and Health Promotion

The two main risk factors which predispose to intra oral squamous cell carcinoma, are smoking and high alcohol consumption. Together they carry an attributable risk of 75-95%. Consequently, it should be possible to prevent a substantial proportion of oral cancer cases. For lip cancer, the main risk factor is exposure to sunlight. Hence the lips should be included in advice regarding the application of sunscreens to prevent skin cancer.

The main reason for the high death to registration ratio for oral cancer is late diagnosis of the disease. Therefore, if reductions in the incidence of oral cancer and improvements in survival rates are to occur, in addition to preventing the development of lesions, it will also be necessary to detect, and where necessary, treat premalignant and malignant lesions, at an earlier stage when they are likely to be small. Examinations of the oral mucosa should therefore form part of a regular dental check-up and opportunistic screening of the elderly and high risk groups should be carried out by general medical practitioners.

Treatment and Continuing Care

The treatment for oral cancer depends on the site and stage of the lesion, with early lesions requiring less radical procedures and having better survival rates. Treatment usually involves surgery and prolonged courses of radiotherapy, followed by rehabilitation which is often difficult because of problems with facial scarring, anatomical

deficits and functional debilities such as drooling and difficulty with eating and speaking.

The management of oral cancer requires multidisciplinary team work and the expertise of a specialist in restorative dentistry is often required particularly at the rehabilitation stage. General and community dental practitioners are also often involved in providing pre-radiotherapy dental treatment and post-therapy continuing dental care.

Recommendations

- 3.4.1** Steps should be taken to increase the awareness of the public regarding the existence, signs and symptoms of squamous cell carcinoma and the association between smoking, high alcohol consumption and the development of oral cancer.
- 3.4.2** All adults should be encouraged to attend for regular dental check-ups, which should include an examination of the oral soft tissues for signs of oral cancer or pre-cancer.
- 3.4.3** Training opportunities relating to the detection of early and pre-cancerous oral lesions should be provided for other health professionals and they should be encouraged to carry out opportunistic screening of high risk individuals.

3.5 OTHER SOFT TISSUE DISORDERS AFFECTING THE ORAL CAVITY

Disease and disorders affecting the oral mucosa and salivary glands may be classified in a number of different ways. One such classification is shown below:

- Infection
- Ulceration
- Pre-cancerous and cancerous lesions
- Developmental
- Oral manifestations of systemic disease
- Miscellaneous

With the exception of the oral cancers, which have been discussed in Section 3.4, the epidemiological information available on oral soft tissue disorders is limited, as such data is not collected and collated routinely at national level. Although prevalence data are sparse in Western Society, many soft tissue disorders involving the oral cavity are known to be rare (Second World Workshop on Oral Medicine, 1995), affecting only a very small proportion of the adult population. However, some, including candidosis, recurrent aphthous stomatitis, lichen planus and dry mouth (xerostomia) are more common.

Candidosis

Approximately 35% of the population harbour small numbers of candidal species in their mouths, as part of their normal oral microflora. Candidal infection is often associated with underlying illness and predisposing factors include: old age, antibiotic therapy, denture wearing (affecting between one-quarter and two-thirds of denture-wearers), corticosteroid and immunosuppressive therapy, haematological deficiencies, poorly controlled diabetes mellitus, dry mouth and HIV infection.

The management of the disease depends on the clinical presentation. However, in all cases the possibility of underlying predisposing factors should be investigated. Therapy is based on topical or systemic antifungal agents, and in cases of denture-induced stomatitis, the habit of wearing dentures both day and night should be discouraged.

Recurrent Aphthous Stomatitis (RAS)

It has been estimated that approximately 15-20% of the UK population are affected by recurrent aphthous stomatitis (recurrent oral ulceration) at some time, with higher prevalences being found among higher socio-economic groups. RAS has been classified as an immunopathological disease, however, the aetiology remains unknown. Factors which have been associated with the aetiology include: haematological deficiency, stress, endocrine disorders, trauma, allergy and hereditary factors.

The diagnosis of RAS is based on clinical appearance and history. Haematological investigation should be undertaken to exclude an underlying deficiency. The condition is characterised by ulceration of the oral mucosa and may be divided by lesion size and number into three sub-groups: minor, major and herpetiform. All are associated with pain.

The treatment of RAS is enigmatic. Many agents including vitamins, antiseptic mouthwashes and topical steroids have been used and while some have been shown to be of benefit to a proportion of RAS sufferers, few have any scientifically-proven efficacy.

Lichen Planus

Lichen planus is a mucocutaneous disease, i.e. a skin condition with oral manifestations. Its prevalence in the UK population is 0.5-2%, with a slightly higher incidence in females than males. Approximately one third of patients with oral lichen planus also have skin lesions. While the oral lesions are generally chronic in nature, persisting for many years, the cutaneous lesions are usually more transient, and often resolve after 2-3 years.

Lichen planus is classified as an immunopathogenic disease of the oral mucosa, and diagnosis is made histologically from mucosal biopsy. The oral appearance of lichen planus is variable, but often consists of white patches or striae which may be symmetrical in appearance. Other patterns include atrophic, erosive and bullous forms.

Treatment is usually restricted to management of the painful, erosive form of the disease and usually consists of antiseptic mouthwashes combined with topical steroid therapy. A small percentage (1-2%) of lichen planus lesions, especially on the tongue and gingivae, may predispose to oral cancer. Hence, all patients with lichen planus should be reviewed on a regular basis.

Dry Mouth (Xerostomia)

The prevalence of xerostomia in the UK population is unknown, but is thought that the prevalence increases with age. However the condition may be due either to a primary salivary gland disease or to a secondary manifestation of a systemic disorder or drug therapy. Primary salivary gland diseases include immunopathogenic disorders, post-irradiation damage or developmental abnormalities. Secondary systemic causes of dry mouth include dehydration and chronic anxiety states and xerostomia is a side-effect of many drug therapies, e.g. antidepressants, antihistamines, hypnotics and hypotensive agents all of which are more commonly found with ageing.

The reduced volume of saliva results in a number of symptoms including difficulty in swallowing and talking, general oral discomfort and difficulty in retaining dentures. The condition is also associated with an increased incidence of dental caries, periodontal disease and oral candidosis.

A number of salivary substitutes are available to alleviate the symptoms of dry mouth, and for those patients with some remaining functional glandular tissue, salivary stimulants may be beneficial. To prevent caries, restricted intake of sugars, rigorous oral hygiene measures and topical fluoride regimens are required. The maintenance of natural teeth to avoid dentures is particularly desirable.

Recommendations

- 3.5.1** Many patients will present to primary health care professionals other than dentists with acute conditions of the oral mucosa. Consequently, training should be made available to general medical practitioners and pharmacists regarding the referral of the appropriate most common of these lesions.
- 3.5.2** Appropriate referral systems should be developed between doctors, dentists and pharmacists.
- 3.5.3** Various drugs, used on a long-term basis for the treatment of chronic conditions, have side effects affecting the oral cavity. The most common manifestation is xerostomia (dry mouth), which can cause severe oral discomfort and increase the risk of caries development. This information should be made available to doctors and pharmacists through appropriate training so that it can be taken into consideration when prescribing and dispensing.

3.5.4 Some oral conditions, e.g. recurrent aphthous stomatitis, although of short duration, can cause considerable distress due to pain. Research should be carried out to determine the impact of such conditions on the general well-being and social functioning of affected patients.

3.6 CONGENITAL AND HEREDITARY DENTO-FACIAL ANOMALIES

Introduction

Dentofacial anomalies/discrepancies comprise a heterogeneous group of congenital disorders which are present at birth, are in some cases genetically inherited, and which continue to have restorative and prosthetic implications for those affected in later adult life. A review of all such anomalies is outwith the scope of this needs assessment but the most common disorders include:

Acquired facial defects (see section on dental trauma)

Facial clefts

Amelogenesis imperfecta

Hereditary defects of dentine

Hypodontia

Conditions requiring orthodontic treatment are addressed in the SNAP report for 'Orthodontic Care'

FACIAL CLEFTS

The facial cleft group of anomalies comprises distinct sub-groups with different aetiologies; cleft lip with or without cleft palate (CL[P]) and cleft palate (CP). Clefts may be unilateral (one side), bilateral (both sides) or affect the midline.

Epidemiology

Differences in prevalence exist between the above subgroups. There is a racial variation in the birth prevalence of CL(P) but not CP. CL(P) is more common in males while CP is more prevalent among female births. CP patients have a higher incidence of associated congenital anomalies.

The total birth prevalence of facial clefts is reported as being 1.53 per 1000 births. This would represent 97 cases per year in Scotland (based on 1993 birth figures).

Current Surgical and Orthodontic Treatment for Clefts

Current recommended practice for surgical/orthodontic treatment of clefts is concentrated during childhood years and aims to achieve full orthodontic space closure following bone grafting, thus avoiding the need for prosthetic/restorative replacement and the long term maintenance that goes with this. A multidisciplinary team is involved from birth (Sommerlad 1989, Shaw & Semb 1990).

Accurate data for Scotland regarding the proportion of teenagers in whom full orthodontic space closure has been achieved is not available but is thought to be significantly less than 90% of cleft cases. The majority of adults aged over 20 years who were born with complete unilateral or bilateral clefts will require long-term prosthetic replacement of teeth in these cleft lines. Adults with unrepaired partial or complete clefts have abnormal growth of the maxilla and the middle third of the face, which may require surgical correction. Even those individuals who have had the recommended treatment regime from birth may require maxillo-facial, nasal and soft-tissue surgery in early adult life.

The problem of outstanding orthodontic treatment need in adults who have not received such care as children is addressed in a SNAP report on Orthodontic Care (1996).

Hypodontia, Amelogenesis Imperfecta and Hereditary Defects of Dentine

For a definition of these terms please refer to the glossary.

These conditions, although relatively rare, require complex restorative care, including crown and bridgework with or without prosthetic replacement, sometimes involving the entire permanent dentition. While this treatment is ideally started during the childhood years, maintenance and replacement care will continue into adult life with consequent resource implications.

Recommendations

3.6.1 Develop minimum data sets to allow determination of the prevalence of these anomalies in the population.

3.6.2 Collect data on treatment costs incurred in adult life as a result of these anomalies.

3.7 OROFACIAL PAIN

Dental and Orofacial Pain

Most dental pain occurs as a result of dental caries and its sequelae. Most orofacial pain is associated with the temporomandibular joints and the muscles of mastication. Other forms of orofacial pain are due to neurological, vascular, or psychological disorders.

Epidemiology

Precise data on the prevalence of orofacial pain in Scotland is not available. Indeed data on other population groups are generally accepted to be inadequate and there is an increasing recognition of the need for epidemiological studies of the prevalence and impact of orofacial pain. The studies which have been undertaken elsewhere show that 50-70% of the population have signs of temporomandibular disorders and 20-25% of the population have symptoms at some stage in their life (Lipton et al 1993; Aghabeigi 1992).

These surveys show that between 3% and 7% of the population seek treatment and that the demand for treatment from these patients is increasing. There are even less reliable data on other forms of orofacial pain. Although there are no accurate data available, evidence suggests that a significant amount of orofacial pain, remains undiagnosed and untreated.

Diagnosis

It is sometimes difficult to make a positive diagnosis of dental pain and often difficult to make a diagnosis of orofacial pain. From time to time patients suffering from dental and orofacial pain present to general medical practitioners, neurologists or ENT Surgeons. When there is doubt about the diagnosis it is important that both medical and dental factors are considered and that, when appropriate, patients are referred between medical and dental specialists (McNeill, 1993). Since psychological factors are involved in some forms of orofacial pain these need to be considered when making a diagnosis. (Solberg 1986).

Treatment

Appropriate treatment is dependent on accurate diagnosis. Many cases can be dealt with by the primary care dentist, but some require referral for specialist diagnosis and treatment. (Gray et al 1994). Forms of treatment include reassurance, advice on parafunctional activity, splint therapy, stress management, physiotherapy and pharmacotherapy (Mathews et al 1994). Routine dental treatment is often also required.

Recommendations

3.7.1 Further investigations should be undertaken to determine the prevalence of oro-facial pain, the availability and efficacy of treatment and the need for further education of Doctors and Dentists.

3.8 TOOTHWEAR

Toothwear is the pathological non carious loss of tooth tissue by erosion, abrasion and attrition. Erosion is

caused by chemical (non bacterial) dissolution of the tooth, abrasion of teeth can be caused by agents coming into contact with teeth e.g abrasive dietary agents or agents used to clean teeth and attrition results from direct tooth to tooth contact.

Epidemiology

The prevalence of toothwear in adults in the UK is unknown, but in a similar western society (Scandinavia), 20% of adults between 20 and 29 years had exposed dentine (the layer under the outer enamel) because of toothwear (Eccles 1979). Toothwear appears to be more common in males than females and severity increases with advancing age. Clinical observation suggests that more patients and dental practitioners are becoming increasingly aware of the condition and there has been an escalation of referrals to specialists. The 1993 national survey of children's teeth revealed that 24% of UK 5 year olds had erosion of anterior teeth in the primary dentition affecting dentine or the pulp (Downer 1995). Furthermore, 30% of children showed evidence of erosion of the permanent dentition. The effects of toothwear are of importance for patients, as problems can arise with pain, function and appearance.

Prevention and Health Promotion

Intrinsic erosion is associated with involuntary or voluntary gastric reflux, whilst extrinsic erosion is associated with dietary or atmospheric factors (Andrew 1982). Dietary factors of significance include carbonated drinks, citrus fruits or juices (Holloway et al 1958; Smith 1989). Of great concern is that, since 1970, the sale of carbonated drinks has doubled, with 65% of all these sales being attributed to adolescents or children (Rugg-Gunn et al 1986). The introduction of low calorie drinks may have reduced the threat to dentitions from dental caries, but the erosive potential of these drinks seems less well appreciated than their sugar containing predecessors. The main preventive measures involve a reduction in the consumption of carbonated drinks and other harmful food and drink. Regular visits to the dentist will enable early diagnosis and treatment.

Diagnosis and Assessment

General principles of management for the dental practitioner involve a comprehensive history and examination (Smith and Knight 1984). Prevention is preferable to treatment in the early stages and these therapies have been detailed in the literature. Clinical observation indicates that the general public are very unaware of toothwear problems which implies the need for the profession to inform them better.

In addition many patients referred to consultants for opinions are distressed that their condition was not identified or treated by their dental practitioner suggesting a need for increasing postgraduate education. This need is reinforced by results of a survey of topics requested by Scottish general dental practitioners, which showed that postgraduate courses in conservative dentistry were perceived to be highly important (Davis and Pitts 1994). Analysis of referrals to specialist centres also indicates the importance placed by general dental practitioners on the value of being able to refer their patients for specialist advice.

Treatment and Continuing Care

Where intervention is needed to treat patients for pain, function or appearance many approaches are possible. There are few longitudinal studies to evaluate the efficacy of different treatment modalities. In this respect further research is necessary to determine the incidence and prevalence of toothwear, to further investigate its causes, and to guide clinicians in its management.

Recommendations

- 3.8.1** Conduct further research into the incidence and prevalence of toothwear.
- 3.8.2** Provide information to clinicians on the cost effective management of toothwear.
- 3.8.3** Assess the need to increase awareness of risks of erosion amongst the general public.

3.9 DENTOALVEOLAR INJURIES

Introduction

Dentoalveolar injuries may be defined as injuries to the teeth and supporting structures, including bone and the soft tissues of the mouth. The injuries can occur alone or in conjunction with other injuries to the maxillo-facial region.

Epidemiology

The majority of dental injuries are caused by participation in sport, although many injuries may be caused by car or industrial accidents as well as by physical violence which may sometimes be related to alcohol consumption.

There are few data available on the incidence of dental injuries in adults, and many minor injuries are not recorded because the individual does not seek professional advice. Moon and Mitchell (1961) estimated that contact sport participants have a 10% chance of oral injury each season and a study by Sane and Ylipaavalniemi (1988) showed that the majority of these injuries resulted in crown fractures (60.4%).

SMR1 and SMR0 data from a major oral surgery unit in Strathclyde indicate a rate of 17 per 100,000 population for mandibular fractures, 0.5 per 100,000 population for fractures of the maxilla and 1.1 per 100,000 population for soft tissue laceration.

Prevention

Much can be done to reduce the incidence of dental injuries, including the use of protective mouthguards in sport, and other facial protection in sport and work settings (Chapman 1988). Awareness of these measures can be raised by all health-care workers, including the dental team.

It has been shown that the risk of injury to the anterior teeth is significantly increased when the upper front teeth protrude extensively over the lower front teeth (an overjet of > 9mm), and early treatment of these malocclusions would help to reduce dental injury (Sams 1991; O'Brien 1993).

Treatment

Although the incidence of these injuries is relatively low, the need for access to specialist treatment is very important. Treatment and rehabilitation costs can be considerable, and discomfort, dysfunction and disability experienced by the patient are important issues.

Apart from immediate treatment to provide pain relief and restore injured teeth to original form and function, more severe injuries will require management to limit disability and secure rehabilitation. This treatment may be complex and expensive, and can involve maxillo-facial surgery, orthodontics and restorative dentistry.

Recommendations

- 3.9.1** Research should be undertaken to establish what data need to be routinely collected to allow planning of appropriate and adequate services to deal with dental injuries.
- 3.9.2** Effective health promotion initiatives should be commissioned with the aim of raising awareness of dental injuries and ensuring that people take preventive measures where possible as well as appropriate action following injury.

4. PROVISION OF DENTAL SERVICES FOR ADULTS

Introduction

The document 'Improving NHS Dentistry' suggested various options for changing the pattern of delivery of general dental and community dental services. There are on-going negotiations between the profession and the Government to agree a way forward. The results of these deliberations will influence the availability of general dental services and will determine therefore the extent to which the community dental service will be required to provide a back-up service.

Adults cannot be considered a homogeneous group with respect to providing dental services. Their ability, motivation and requirement to pay as well as their level of dental health, treatment needs and area of residence all influence the type of service required.

4.1 GENERAL DENTAL SERVICE

The general dental service is the main provider of dental health care in Scotland. In 1994/95 3.5 million treatments were performed at a cost of £136 million. This is a 6% rise in costs and activity over the previous year.

General dental services are provided mainly by general dental practitioners who are independent contractors with local Health Boards. Their location is determined by market forces and their distribution throughout Scotland and within Health Board areas varies depending on demand. This open list situation has a core advantage that entrepreneurial dental activity identifies demand for service delivery and provides private capital, organisation and ancillary manpower on an independent contractual basis to the Health Boards. A disadvantage can be that, particularly in urban situations, there can arise an over supply of practices in relation to local demand whereas in rural locations the opposite is the case. Management of the general dental services is only possible currently by indirect mechanisms such as fee relativities, prior approval of treatment plans and rates reimbursement. Since 1990, when the new general dental services contract was introduced, patients for the first time have been able to register with a dentist. Registration rates amongst adults vary with the area and with the age group. Approximately 47% of adults in Scotland are registered with a dentist but the percentage of the elderly who are registered is very much lower. Recent work tracking patients over a ten year period has shown that less than 20% of adults continually attend the dentist on a regular basis (Nuttall and Davies, 1991). When reviewing Dental Practice Board returns however the key figure to judge uptake of continuing care is the proportion of continuing care contracts which are successfully rolled on, rather than how many people are registered at any given time. Clearly there are implications for the provision of services for the adults who do not avail themselves regularly of the general dental services, many of whom fall into the older age groups who would be more prone to oral cancer, and would therefore benefit from regular examinations. Seventy per cent of adult patients attending are eligible to pay for dental treatment.

Over the next few years it is anticipated that the method of payment to NHS dentists will change and that a more locally sensitive method of commissioning dental services is introduced. It is recognised however that this is a new concept therefore careful evaluation will be required.

The extent to which private contracts for care are used to replace or supplement NHS treatment has not yet been quantified. Anecdotal evidence however suggests the incidence of private contracts is rising.

In the future, a greater number of "specialist practices" may be made available to the public but this is subject to further discussion and plans have not been agreed.

4.2 COMMUNITY DENTAL SERVICE

The Community Dental Service (CDS) is a directly managed salaried service which operates within 19 Trusts and the three Island Health Boards in Scotland.

The role of the service is governed by Scottish Office circular SHHD/DGM (1989) 15. The main areas of responsibility are:

1. oral health screening.
2. dental health education and preventive programmes
3. provision of a safety net treatment service for adults who are otherwise unable to obtain care from the general dental services
4. epidemiological surveys of oral health

Since 1989 the Community Dental Service has changed its remit to provide a service for those people who would not otherwise be able to get care. In the main, this has been limited to those adults with special needs but it is suggested that in the future the Community Dental Service should broaden its remit and increase the safety net aspect of the service. Careful planning and monitoring of this will be required to ensure that the requirement of people with special needs does not suffer as a result of the demands by other sectors of the population.

To a varying extent throughout the country the Community Dental Services have endeavoured to refer routine healthy school children towards the general dental services with the intention of being able to concentrate on people with special needs. The ability of the service to guide children to the general dental services has been dependant on availability of general dental services locally and the acceptance of patients by general dental practitioners. Children who have poor dental health may in some areas find it difficult to register with a general dental practitioner under the current system and some children require the service to be taken to them because of social difficulties.

The Community Dental Service also fulfils a non treatment function in relation to oral health and epidemiology as contracted by the service planners.

4.3 HOSPITAL DENTAL SERVICE

The hospital dental service is provided in Dundee, Edinburgh and Glasgow from the respective dental hospitals and in other parts of the country from District General Hospitals. Specialities covered are Oral and Maxillofacial Surgery, Orthodontics, Restorative Dentistry, Paediatric Dentistry, Oral Medicine, Oral Pathology and Dental Radiology.

In Dundee and Glasgow the respective Universities also provide clinical input and a significant function of dental hospitals is that of education and training.

Patients are referred to hospital consultants through their dental or medical practitioner and are either treated and/or referred back to the practitioner with advice.

All dental hospitals provide direct access for patients with acute dental problems for which they are unable/unwilling to attend primary dental services.

There is a need to ensure that referrals to the hospital are appropriate in order that valuable resources are used more efficiently. There is also a need to ensure that communication between the hospital consultants and primary care practitioners is adequate.

4.4 PEOPLE WITH SPECIAL NEEDS

With the introduction of the Community Care Act particular attention has been paid to providing medical services to people with special needs. This provision has not always included dentistry and due recognition has to be given to the special requirements of this group of adults.

These patients who may have been well catered for during their stay in long term accommodation have to be followed up to ensure their dental health does not deteriorate as a result of "normalisation". Assessment of individuals leaving such accommodation for a life in the Community should include an Oral Health Needs Assessment and appropriate care plans. Currently it is not a routine requirement in all parts of the country for this to be written into protocols for pre-discharge assessment nor is it always recognised in residential or nursing homes.

Health staff should be made aware of the special needs of these adults and adequate training should be provided.

4.5 INTEGRATION OF SERVICE

The three main branches of dentistry should be providing a complementary service to the population to achieve the greatest health gain in the most efficient way.

The practice of dentistry and medicine are closely linked but are independent of one another. There would be value in exploring means of the two professions identifying areas of common interest and ascertain how best they can work together to benefit the patients.

The continuing development of new techniques and in particular advanced restorative care e.g. implants will require close cooperation amongst the services to ensure that an appropriate level of care is carried out in the most cost effective way.

Recommendations

- 4.1 In the light of the Government White Paper alternative models of dental care delivery in the Primary Care Services should be researched to ensure adequate delivery of service.
- 4.2 Adequately funded preventive strategies should form part of the general dental services care delivery.
- 4.3 Health boards should monitor supply of specialist services in primary and secondary care settings with a view to ensuring adequate supply.
- 4.4 The provision of dental services should be available to people with special needs, whether they are in the community, residential or hospital care.
- 4.5 Best use should be made of opportunities for dentists to work with other health professionals to maximise health gain.
- 4.6 The overwhelming majority of adult Scots do not attend for annual dental check-ups. Identifying ways of changing this should be a major element of research and development within the dental service.
- 4.7 Continuity of care should be encouraged and frequent changes of dentist discouraged.
- 4.8 Improved techniques for determining actual rather than claimed attendance pattern should be developed for future epidemiological studies.
- 4.9 Appropriate levels of specialist or consultant referral services should be available in each area following assessment of requirements.
- 4.10 There should be continued emphasis on the promotion of continuous education for all members of the profession.

5. ECONOMIC ISSUES IN ADULT ORAL HEALTH

Introduction:

The aim of this section is to address the economic issues that are raised by the recommendations contained in this report. It focuses on how priority setting can be performed in adult oral health.

Table 1

The three stages of PBMA (adapted from Donaldson, 1995).

Stage 1 (the programme budget).	Statement of expenditure and activity by main subjects/conditions
Stage 2	Decide on services which are candidates for expansion/introduction and services which are candidates for reduction.
Stage 3	Measure the costs and benefits of proposed changes (i.e. marginal analysis).

The SNAP Report on Programme Budgeting and Marginal Analysis (PBMA) explains the procedure to be followed for each subject and Table 1 highlights the main stages.

A review of the literature in the area of oral health has shown that the majority of the work on the economic aspects of the main subjects/conditions identified in this report has been performed in the area of dental caries (Parkin & Yule 1996). Table 2 shows the number of studies identified in each area. While this search is unlikely to have been exhaustive it does show that very little work has been performed in other areas. In order to assess each recommendation the economic literature has been reviewed and suggestions have been made for future topics of research.

Table 2

Distribution of economic studies in dental health

Dental Caries
 Periodontal disease
 Missing/lost teeth
 Dental facial discrepancies
 Other soft tissue conditions
 Oral/facial pain
 Tooth wear
 Dental injuries

Area 1
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Number of economic studies

Dental Caries

The economic evaluations in the area of dental caries have focused on the evaluation of programmes which prevent dental caries. These preventive programmes can be split into two areas: fluoridation schemes or fissure sealants. Typically such studies have considered that filled teeth and undecayed teeth are valued at the same level above decayed/lost teeth. Work performed by Fyffe and Kay (1992) suggests that this is not the case and that unfilled healthy teeth are valued more than filled teeth, which in turn are valued more than decayed teeth and decayed teeth are valued more than lost teeth. This work suggests that there are substantial benefits of prevention which are ignored such as the avoidance of the use of needles and drills.

Forms of caries prevention other than water fluoridation which have been considered are the use of fissure sealants, fluoridised salt and health promotion campaigns to promote caries preventing behaviour (e.g. effective tooth brushing campaigns) (Donaldson et al 1986). In the case of sealants, studies have shown that they are less cost-effective than fluoridation and use more resources but produce more benefit than restorative care (Weintraub et al 1993). There is also an issue that the effectiveness and efficiency declines rapidly if the quality of the sealant application technique is not perfect. The questions for commissioners are whether the expected benefits are worth more than the expected cost and, if so, from where will the extra resources come. The use of fluoridised salt as a preventive measure has not been addressed though the use of other fluoride supplements has been clinically evaluated. Additional research is required to evaluate the efficiency of these options in comparison to restorative care, fissure sealants and health promotion techniques to determine which are viable alternatives.

Periodontal disease

Economic evaluations of the treatment and prevention of periodontal disease are limited. Though there are reports of effective treatment for these conditions it should be remembered that all cases of periodontal disease may not progress and this will have the effect of reducing the relative efficiency of treatment unless high risk cases can be identified and treated. For patients with advanced periodontal disease specialist treatments are required (Antczak-Bouckoms et al 1993). There is a research issue about the appropriate level of specialist services to provide. An economic evaluation could investigate the efficiency of different levels of provision.

Other key areas of adult dental health

The contribution that economics has made to the other areas of dental health is minimal. Therefore the recommendations made in the other areas of adult oral health have been considered in terms of how important are their economic implications. From this, suggestions have been made on the direction of future research.

A number of recommendations are made with respect to oral cancer which have economic implications. A proposed health education campaign to increase the public awareness of oral cancer would require an economic evaluation to investigate what the appropriate strategy and target population should be. Research is required to identify the most efficient screening strategy, a possible area where this research may concentrate is in the identification of the most appropriate target population.

Another recommendation of this report is that there should be adequate provision of secondary care specialists for the treatment and continuing care of patients with dentofacial anomalies or disorders affecting the soft tissue of the oral cavity. It would be worthwhile to evaluate different levels and different distributions of provision. Such an analysis could take account of the costs and benefits of provision as well as the preferences of consumers regarding the provision and distribution of services.

In the area of tooth wear, two recommendations are likely to have resource consequences. The first of these is a health education campaign to highlight the dangers of tooth wear. An economic evaluation could be performed to elicit the costs of such a programme and its short and long term consequences. This evaluation could be used to determine if such a campaign is worthwhile but also if it is more efficient to concentrate the campaign on specific groups in society. A second area where some form of economic evaluation could be performed is on the

provision and distribution of specialist services for the treatment and management of tooth wear.

In relation to dental injuries and the awareness campaign, future work in this area could include the economic evaluation of such a campaign and it could look at both what target population is chosen and the method of delivery.

Equity issues

The distribution of dental ill health within a population is correlated with the socio-economic background on the individuals in that population (Todd & Lader 1991). Studies have shown that lower socio-economic groups are less likely to take preventive dental actions (e.g. tooth brushing, flossing and dental visits) (Eddie & Davies 1985, Chen & Stone 1983). However, there is also some evidence that people from lower socio-economic groups have less access to dental care due to the geographical distribution of dentists. It has been suggested that dentists are less likely to practice in poorer areas since it is not easy to maintain a target income and there is little likelihood of any private income (Groenewegen & Postma 1984). This is reinforced by the impression that visits to the dentist are not worthwhile (caused by previous poor access to dental care) and therefore, demand for preventive dental services is limited. Research is required to assess how dentists can be relocated to areas with low dental cover and how the perceived valuation of dental services can be increased amongst the population in these areas so that the extra supply of dental services is utilised efficiently.

Recommendations

- 5.1 Conduct research to determine the social and economic impact of poor dental health amongst individuals and groups.
- 5.2 Second best alternatives to water fluoridation need to be assessed for their usefulness in the short to medium term.
- 5.3 Research is required to assess the relative efficiency of different strategies of the treatment and prevention of periodontal disease.
- 5.4 Further work is required on the evaluation of the appropriate level of provision and distribution of specialists.
- 5.5 Further work is required to evaluate health education policies.

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GLOSSARY OF TERMS

ABRASION:

The progressive loss of hard tooth substance caused by mechanical factors other than mastication (chewing) or tooth to tooth contacts.

AMELOGENESIS IMPERFECTA (AI):

A hereditary disorder of enamel formation resulting in a deficiency in enamel thickness and/or mineralisation.

The condition is associated with yellow-brown discolouration of the teeth, pitting of the enamel surface, attrition (wear) of the teeth, spacing and in some cases an anterior open bite.

The condition is rare in the community. AI of all types has been estimated to occur in the general population about 1 in 14,000. This would represent about 4-5 new cases in Scotland each year, but accurate data is not available.

ATTRITION:

The progressive loss of hard tooth substance caused by mastication (chewing) or tooth to tooth contacts.

BRIDGE:

A dental appliance replacing a missing tooth or teeth. The appliance is supported by crowns or veneers placed on natural teeth adjacent to the space created by the missing tooth or teeth.

BRIDGE PONTIC:

The pontic is the part of the bridge filling the space created by the missing tooth.

CALCULUS:

Plaque which has undergone mineralisation is referred to as calculus or tartar. It comprises mostly of calcium phosphate as well as an organic element of protein, carbohydrate, lipids and various non-vital organisms. The rate of calculus formation is very variable between individuals. It may be present above the gum margin (supra-gingival calculus) or below the gum margin (Sub-gingival calculus). It is always covered by soft plaque and retains toxic bacterial products.

CANDIDOSIS:

An opportunistic fungal infection of the oral mucosa which can present in the form of white patches or redness and in some cases soreness of the lining of the mouth.

CHRONIC GINGIVITIS:

A reversible inflammation of the gingivae without destruction of the supporting tissues. Characterised by enlargement of the gum margins which tend to bleed spontaneously or on tooth cleaning. While not directly threatening to tooth survival, it may prejudice good restorative treatment and is a precursor of chronic periodontitis.

CHRONIC PERIODONTITIS:

The form of periodontal disease which results in destruction of periodontal support, with the formation of gum pockets, and, when sufficient bone has been lost, development of tooth mobility and eventual loss of teeth. It may be associated with acute infection or movement of teeth with consequent deterioration of function and/or appearance. The commonest form is adult chronic periodontitis. Other forms include (a) early onset periodontitis, (b) pre-pubertal periodontitis, (c) juvenile periodontitis, (d) rapidly progressive periodontitis and (e) periodontitis associated with systemic disease.

DENTAL ANXIETY:

An emotional and psychological behaviour state precipitated by the need or desire for dental care. A common self-reported reason for avoiding going for a dental check-up.

DENTAL INDIFFERENCE:

A term describing a lack of concern about oral health, which is a common self-reported reason for avoiding going for a dental check-up.

EDENTULOUS:

Having no remaining natural teeth.

ENDOSSEOUS IMPLANT:

An inert metal implant which is surgically placed into the bony substance of the jaw (either upper or lower) which has an external attachment used for retention of a prosthesis or other appliance replacing missing or lost teeth.

EROSION:

The non-bacterial chemical dissolution of tooth material. It is classified as intrinsic or extrinsic. Intrinsic erosion is associated with involuntary or voluntary gastric reflux while extrinsic erosion is associated with dietary or atmospheric factors

HEREDITARY DEFECTS OF DENTINE:

There are two major types of genetic diseases affecting the structure of dentine. The first includes genetic traits

causing alterations in teeth alone, while the other major group includes disorders affecting other tissues of the body also.

Such defects include, taurodontism, pulpal dysplasia, coronal and radicular dentine dysplasia, fibrous dysplasia of dentine, hereditary opalescent dentine and dentinogenesis imperfecta.

Epidemiological information on the prevalence of this and the other conditions is not available but they are rare in the community.

HYPODONTIA:

A condition in which teeth fail to develop and are absent. It more commonly affects the permanent dentition and has a prevalence of between 3.5 and 6.5%, with a female to male ratio of 3:2.

Characterised by missing teeth, microdont, tapered or conical teeth and retained deciduous teeth. It also results in impaired alveolar development and leads to worries about facial appearance.

Hard statistical information at a Scottish level and data on adult treatment costs are not currently available.

LICHEN PLANUS:

A condition which can affect both the oral mucosa and the skin. Its appearance in the mouth is variable, but often consists of white patches or striae which may be symmetrical.

LOSS OF ATTACHMENT:

Healthy gingival tissues are attached to where the crown of a tooth meets its root - the cemento-enamel junction. Tissue destruction as a result of periodontal disease causes this attachment to be lost. Periodontal probes normally measure this loss of attachment as the distance from the cemento-enamel junction to the bottom of the gingival sulcus. It is a measure of previous periodontal destruction, not of existing disease.

MARGINAL BONE LOSS:

Loss of bone normally present beneath the gingival tissues and between the teeth as a result of periodontal disease. It is a measure of previous periodontal destruction, not of existing disease.

NON-MILK EXTRINSIC SUGARS:

Sugars which are not part of the cells in a food, but which are free or added to food. They include sucrose, fructose, glucose, honey, sugars added to recipes and drinks, and table sugar.

OVERJET:

When the upper and lower jaws are closed together without straining, the front teeth meet together with a slight overlap horizontally and vertically, the upper teeth in front of the lowers. The horizontal overlap is referred to as the overjet.

PERIODONTAL DISEASE:

Includes all pathological conditions of the periodontal tissues supporting the teeth (the periodontium). It is, however, commonly used with reference to those inflammatory diseases which are induced by microbial plaque and which affect the supporting tissue of the teeth.

PERIODONTAL POCKET:

Apical (rootward) extension of the inflammatory process described as chronic periodontitis results in destruction of periodontal tissue and the formation of a pocket.

PLAQUE:

A soft almost invisible layer of bacteria which forms on the tooth surface and is present in all mouths.

RECURRENT APHTHOUS STOMATITIS:

A condition characterised by recurrent ulceration of the oral mucosa and which is classified by the size and number of ulcers present.

ROOT PLANING:

The mechanical removal of part of the root surface (cementum) which has deposits of calculus embedded in it.

SCALING:

The mechanical removal of calculus deposits from above (supra-gingival scaling) and below (sub-gingival scaling) the gum margin. Sufficient for removing plaque and calculus from enamel, leaving a smooth clean surface.

TOOTHWEAR:

Describes the non-cariogenic loss of tooth tissue and describes wear of the teeth which may be a result of erosion, abrasion, attrition or a combination of all three.

XEROSTOMIA:

A term used to describe dryness of the mouth which occurs as a result of reduced production of saliva. It is associated with difficulty in swallowing and talking, general oral discomfort, and in some cases increased levels of dental decay.