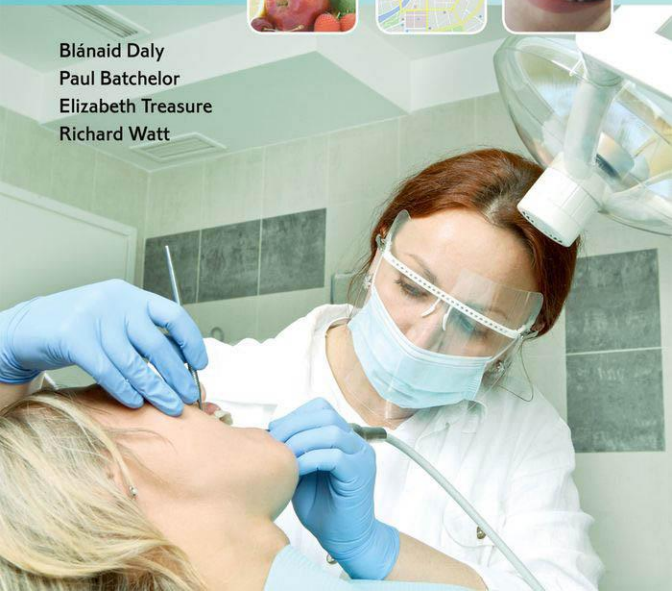


Essential Dental Public Health

Second Edition



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Foreword

The time is now right for developing a new approach to promote oral health. One that considers oral health as an integral part of general health and addresses the needs and demands of populations and includes an integrated public health approach to tackle the social determinants of chronic diseases. Greater recognition should be placed on effectively promoting oral health as there is a growing body of evidence of the benefits and effectiveness of investing in health promotion programs through an integrated approach. Integrated health promotion programmes deliver benefits for the community through promoting positive wellbeing, strengthening community capacity as well as minimizing the burden of serious diseases, such as diabetes and cardiovascular disease. A health promotion approach moves health from an individual lifestyle/choice model to a broad community issue. Health is created where people live, love, work and play. Therefore a public health promotion strategy starts from settings of everyday life within which health is promoted, rather than with disease categories, and with strengthening the health potential of the respective settings. Because, to change behaviours one needs to change the environment that predisposed people to health compromising behaviours. That is why health promotion involving concern for social and physical environments supportive of health is pivotal to improving health. A re-orientation from prescription to health promotion, should redress the balance of influences and make healthier choices easier, facilitate decision-making skills rather than be prescriptive. Health promotion includes combatting the influences of those interests which produce and profit from ill health. That involves controls on industry sponsored educational materials in schools, advertising, and campaigns to reduce barriers and enable and empower people.

There is a growing realization that oral health is an integral part of overall health, and shares many common risk factors with leading non-communicable disease (NCDs)

because there are associations between risk factors for oral disease and major NCDs. This realization led the WHO to re-orient its Global Oral Health Programme to foster its integration with chronic disease prevention and general health promotion. The World Health Assembly's resolution on oral health: action plan for promotion and integrated disease prevention urged Member States to adopt measures 'to ensure that oral health is incorporated as appropriate into policies for the integrated prevention and treatment of chronic non-communicable disease and communicable disease, and into maternal and child health policies' (Peterson 2008). Recently, the declaration of the High-level United Nations Meeting on Prevention and Control of Noncommunicable Disease commits governments of the world to significant and sustained action to address the rising burden of noncommunicable diseases (NCDs) such as diabetes, cancer, cardiovascular and respiratory diseases and oral diseases (UN 2011). The Declaration calls for integrated and cross-sectoral approaches to tackle noncommunicable diseases—an approach highly appropriate for most oral diseases. It is appropriate because the risk factors for oral diseases are common to other major chronic diseases. Therefore using the Common Risk Factor Approach (CRFA) will become mainstream for all health sectors and dentists must be involved in applying that approach by incorporating programmes for promotion of oral health and prevention of oral diseases into programmes for the integrated prevention and treatment of chronic diseases such as heart diseases, cancers, hypertension and diabetes.

The way forward for oral health policy is that policy makers and deans of dental schools need to allocate a higher priority and resources to oral health promotion directed at the social determinants of risk factors common to a number of diseases, the Common Risk Factor Approach; to behavioural and political factors.

The WHO Commission on Social Determinants of Health (CSDH 2008) defines social determinants of health (SDH) as ‘the structural determinants and conditions of daily life responsible for a major part of health inequities between and within countries’. The determinants of health and health inequalities—the ‘causes of the causes’, are socially patterned and this patterning may pass from generation to generation. However, insufficient attention is given to the causes of behaviours, the underlying social and environmental conditions that influence behaviours. Environmental conditions deserves much more attention.

Another important reason for changing from the current approach to one using public health principles outlined in this book, is that high levels of dental diseases persist despite the availability of a scientific epidemiological basis for preventing them. There is a large gap between what is known and carried out in practice. Dentistry has not been capable of controlling, nor effectively or efficiently preventing diseases. In an era of evidence-based public health medicine and dentistry, such approaches are no longer acceptable. The limitations of what conventional dentistry has achieved are serious. Therefore, on humanitarian grounds alone, a major shift to effective dental public health approaches are essential.

Unfortunately relatively little emphasis is currently placed on effective dental public health and consequently high levels of dental disease and dental pain and functional disability are common. The main emphasis remains on replacing artificially tissue lost by disease despite the fact that no disease has ever been treated away. The current approach is equivalent to dentists and their teams trying to clean the mess on the floor with better and more efficient brooms, whilst leaving the tap full on. So the mess persists and may get worse and affect the underlying structures. Then more costly treatments are needed to remedy the accumulated destruction. A more rational solution is to try to turn the tap off, tackling the determinants of health, and cleaning up the smaller mess that remains. That requires dentists to deal with the determinants of the diseases and treating what remains effectively.

Greater emphasis must be given to the development of interventions that focus on the ‘causes of the causes’

of oral and general diseases because many of the risks for disease and poor health functioning are shared by large numbers of people. One-to-one chairside interventions do little to improve the overall oral health of populations because new people continue to be afflicted even as ‘sick’ people are treated or cured. It therefore is more cost-effective to prevent many chronic diseases using a common-risk factor approach at the community and environmental levels than to address them at the individual level. An important focus for prevention should therefore relate to policies to control diet and to behaviour change. The environment determines behaviour. The most effective way to change behaviour is to change the environment within which people live. Making healthy choices the easier choices and unhealthy choices more difficult. Such a policy is enabling and supportive.

The future roles of dentists therefore is to advise patients and communities about risks to dental health, investigating and controlling the risks, influencing the health related behaviours of patients and populations by changing their environments, diagnosing oral and dental diseases and assessing patients’ needs based on a combination of normative and perceived needs, providing high quality evidence-based dental care—doing the right thing and doing it right, and administration of a dental team. Most dentist involvement in dental public health policy development will be as health advocates. Every health professional has the potential to act as a powerful advocate for individuals, communities, the health workforce, the general population and their elected representatives. Since many of the factors that affect health lie outside the health sector, dentists may need to use their positions both as experts in health and as respected professionals to investigate or encourage changes in policies in other sectors. To increase effectiveness, advocates build partnerships with the community, other professional groups, and other sectors. They place their skills at the disposal of the community. Being available, not on top.

Understanding and adopting the principles of dental public health described in this book should be considered as essential as knowing the principles of clinical procedures. In order for the oral health workforce to

successfully reduce dental diseases and tackle inequalities in oral health the right education is essential. Teaching dental public health should form the central hub of dental education around which its biological, clinical, and technological spokes should revolve. Incorporating the principles outlined in this book will enable dentists to fulfill their professional and civic roles as altruistic health workers and encourage trust and personal satisfaction because they have done their best.

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Preface to the second edition

When we wrote this book 11 years ago, Dental Public Health (DPH) was a comparatively new specialty, still defining its role in oral health policy and the delivery of oral health services. That role is now well established and DPH is a core topic in undergraduate dental curricula (GDC 2011, Association of Dental Education in Europe 2010) and is shaping oral health policy and the delivery of oral health services.

In England, DPH has informed the development of the oral health strategies *Choosing Better Oral Health* (2005) and *Valuing People's Oral Health* (2007) and the evidence based toolkit for prevention of dental disease in primary care *Delivering Better Oral Health* (2012). In terms of oral health service delivery, the *Steele Independent Review of NHS Dentistry* evidenced a sea change in dental policy by placing public health at the heart of dental services.

In Scotland there is the innovative national *Childsmile* dental prevention programme which starts in early childhood and aims to improve children's oral health and tackle oral health inequalities. In Wales legislation has recently been enacted to support development and introduction of clinical care pathways for people with special needs as well as the introduction of *Designed to Smile* also aimed at improving pre-school children's oral health.

At an international level, there is a growing consensus on the need to tackle the social determinants of health and much high quality oral health research is directed at describing and understanding oral health

inequalities. The International Association of Research (IADR) has recently called for this agenda to be moved forward and for researchers to focus now on researching the implementation of strategies to reduce oral health inequalities.

The role of DPH is therefore well established, and whilst it focuses on the broader picture at a population level the practice of dental public health is everybody's business, particularly the dental team in primary care that makes first contact with patients and the public. It is essential that the dental team is equipped with the appropriate knowledge, skills, and values required to perform its role in society.

In the light of all the developments over the last 11 years it is time to update this book. We have retained the format of the first edition and kept it as a basic introductory text. As with the first edition we have provided additional references for those of you who want to explore the topic in more depth.

We are very pleased that the first edition of the book has reached such a wide audience. We have enjoyed meeting students both in the UK and abroad who have used this book and we have incorporated their insights and feedback in producing this updated version.

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1 Introduction to the principles of public health

CHAPTER CONTENTS

Introduction

Definition of dental public health

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Ottawa Charter

Millennium development goals

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Core themes of dental public health practice

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Further reading

By the end of this chapter you should be able to:

- Define dental public health.
- Identify the links between clinical practice and dental public health.
- Outline the criteria used to determine if a condition is a public health problem.
- Describe the central arguments presented by the critiques of the biomedical approach to health care delivery.

This chapter links with:

- All the other sections in this text by providing the background to dental public health.

Introduction

Public health is now recognized as being a core component of the undergraduate medical and dental curricula in many parts of the world (Association for Dental Education in Europe 2010; General Dental Council 2011; General Medical Council 2009). This recognition acknowledges that public health is an important subject relevant to the practice of medicine and dentistry. This chapter will outline what is meant by public health and, in particular, its relevance to clinical dental practice. The philosophical and historical background of public health will be reviewed and the limitations of the traditional system of health care highlighted. Finally, a dental public health framework will be outlined to highlight the central importance of public health to the future development of dentistry.

Definition of dental public health

Dental public health can be defined as the science and practice of preventing oral diseases, promoting oral health, and improving quality of life through the organized efforts of society.

The science of dental public health is concerned with making a diagnosis of a population’s oral health problems, establishing the causes and effects of those problems, and planning effective interventions. The practice of dental public health is to create and use opportunities to implement effective solutions to population oral health and health care problems (Chappel *et al.* 1996).

Dental public health is concerned with promoting the health of the population and therefore focuses action at a community level. This is in contrast to clinical practice which operates at an individual level. However, the different stages of clinical and public health practice are broadly similar (Table 1.1).

Dental public health is a broad subject that seeks to expand the focus and understanding of the dental profession on the range of factors that influence oral health and the most effective means of preventing and treating oral health problems. Dental public health is underpinned by a range of related disciplines and

sciences that collectively enrich the value and relevance of the subject (Box 1.1)

Relevance of public health to clinical practice

The practice of dentistry is undergoing a period of rapid change due to a wide range of factors in society (Box 1.2). The knowledge and skills required for the

Box 1.1 Sciences and disciplines underpinning dental public health

- Epidemiology
- Health promotion
- Medical statistics
- Sociology and psychology
- Health economics
- Health services management and planning
- Evidence-based practice
- Demography

Box 1.2 Changes affecting the practice of dentistry

Epidemiological changes Changing pattern of disease; for example, dramatic improvements in caries, persistence of oral health inequalities.

Demographic shifts Ageing population, changes in family structures, greater population mobility, increasing cultural diversity.

Organizational changes Health service reforms, greater emphasis on primary care services and prevention, evidence-based medicine/dentistry, corporate bodies, clinical governance.

Professional development Importance of life-long learning, team work, interpersonal skills.

Social change Consumerism, increasing public expectations and demands on health services, widening social and economic inequalities.

Political pressures Changes to the welfare state, pressures for cost containment on public spending, rationing care, increasing professional accountability.

Technological change Health informatics, pharmaceutical developments, ‘new genetics’, new dental materials.

Table 1.1 Stages of clinical and public health practice

Individual clinical practice	Public health practice
Examination	Assessment of need
Diagnosis	Analysis of data
Treatment planning	Programme planning
Informed consent for treatment	Ethics and planning approval
An appropriate mix of care, cure, and prevention	Programme implementation
Payment for services	Types of finance
Evaluation	Appraisal and review

Modified from Young and Striffler 1969.

next generation of dental professionals will therefore be very different than was previously the case.

Studying dental public health provides an ideal opportunity to gain an improved understanding of many of the factors outlined in Box 1.2. Three key areas are most relevant to the practice of clinical dentistry, as detailed in the following sections.

Epidemiology of oral diseases

It is essential that dental services are developed to address and effectively meet the oral health needs of individuals and the wider community. Knowledge of the epidemiology of oral disease will facilitate an understanding of the extent, aetiology, natural history, and impacts of oral conditions. By applying critical appraisal skills in their clinical decision-making, dental professionals can practise dentistry more effectively through an evidence-based approach to care. Clinical epidemiology provides the skills required to undertake this task by teaching the principles of study design and evaluation.

Prevention and oral health promotion

Prevention is as pivotal to the dentist's role as treatment of disease. A core aspect of dental public health is exploring the principles of prevention and oral health promotion and identifying opportunities for effective preventive interventions. This requires an understanding of the social, political, economic, and environmental factors that influence oral health and the capacity of dentistry to influence them. Of particular importance to oral health is a broad understanding of diet and nutrition, body hygiene, tobacco use, and the use of fluorides in the prevention of dental caries, periodontal disease, and oral cancers.

Planning and management of health services

Dental services are a part of the health care system and are affected by many of the complex organizational and policy developments of the wider health, social,

and welfare systems. It is essential that dental professionals have a broad understanding of the changing structure, organization, and finance of their health care system. This knowledge will enable dentists to plan and develop their dental practices more effectively.

What is a public health problem?

It is now widely recognized that demands on health care systems will always be greater than the resources available to meet these needs. This dilemma is not confined to the developing world where resources are acutely limited. The richest countries in the world, such as the USA, Germany, and the UK, are faced with similar problems of increasing demands and escalating health care expenditure. For example, expenditure on health care in the USA rose from 5.1% of gross domestic product in 1960 to 17.6% in 2010 (OECD 2012). Across the OECD, the average expenditure on health care is now 9.6%. In the UK, spending on the General Dental Services has risen steadily over recent decades. In 1977/78 the figure was £270 million, by 1997/98 it was £1528 million, and in 2012 it was estimated to be in excess of £3.3 billion.

DISCUSSION POINTS 1

What factors contribute to the increasing demands on health care systems?

Are there any ways in which this demand can be controlled?

One response to increasing demands and limited resources is to direct resources to particular priority areas. However, what would be considered an important problem? This is where core public health principles have a major contribution to make. Box 1.3 lists certain public health criteria that can be used to determine the significance of a health problem (Sheiham 1996).

The first criterion relates to the prevalence of the health problem, in essence is the disease widespread? Who has the disease? What percentage of the total

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population is affected? What is the distribution of the disease within the community? Is the prevalence of the condition increasing or decreasing? The second aspect relates to the impact of the condition at the individual level. How severe are the effects of the disease to the patient? For example, do people die as a result of it? Do they suffer pain, discomfort, or loss of function? Can they perform their normal social roles? Are they prevented from going to school or becoming employed because of the problem? The third aspect relates to the effects of the disease across society. What are the costs to the health service of treating the condition? How much time do people take off work to get treatment and care? What effect does the condition have on economic performance and productivity of the country? Figure 1.1

presents a summary of the impact of oral conditions on the individual and society. Finally, it is important to consider the potential for prevention and treatment of the disease. Is the natural history of the disease fully understood? Can the early stages of the condition be recognized? If so, are there interventions that can be implemented to stop the disease progressing? If it does progress, are there effective treatments available?

DISCUSSION POINTS 2

Apply the criteria from Box 1.3 to dental caries, periodontal disease, and malocclusion.
Do you consider these oral health conditions are dental public health problems?
Explain the basis for your answer.

Box 1.3 Criteria for a public health problem

- Prevalence of the condition.
- Impact of the condition on an individual level.
- Impact on wider society.
- Condition is preventable and effective treatments are available.

Public health movement: history and background

Public health is not a new subject. Indeed, it has a long and interesting history, which is linked to many of the social, economic, and political changes that have

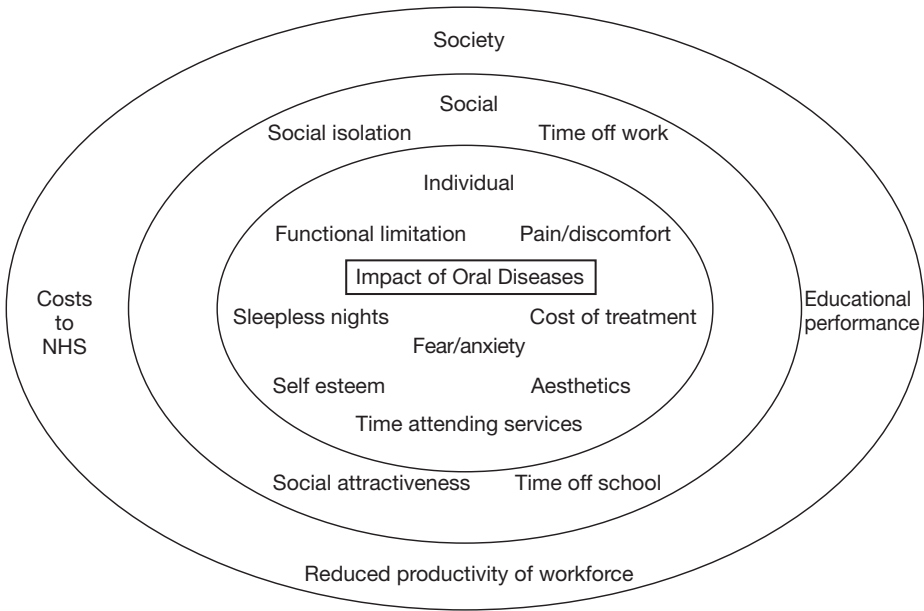


Figure 1.1 The impact of oral disease.

occurred in history in the last 150 years. The public health movement originally arose in response to the appalling living and working conditions that affected a high proportion of the working classes in the industrialized world in the 19th century. Rapid industrialization and urban growth created industrial towns and cities in which overcrowding, extreme poverty, squalor, and disease were commonplace. Pioneering social reformers such as Southwood Smith, Edwin Chadwick, and John Snow identified the need to improve the living and working conditions of the poor to promote the public health. In the UK, municipal reforms and improvements in the environment then resulted from passing legislation such as the Public Health Act 1875.

One example of this early public health approach to dealing with disease is the response to a cholera outbreak in Soho, London, in 1875. John Snow, a local doctor, identified that cholera was a waterborne disease by mapping the outbreak to a single water source, a water

pump in Broad Street. By removing the pump handle, the epidemic was controlled as no one could then access the infected water source (Figure 1.2). This is an example of public health practice in action: an epidemiological assessment of the problem, identification of the environmental cause of the infection, and implementation of effective action, cheaply and quickly.

DISCUSSION POINTS 3

- If John Snow had not been in Soho, how would this cholera outbreak have been dealt with by his less enlightened colleagues?
- What would have been the obvious limitations of this approach?

Public health reforms that focused upon improving environmental conditions which significantly boosted the health of the poor in Victorian and Edwardian Europe

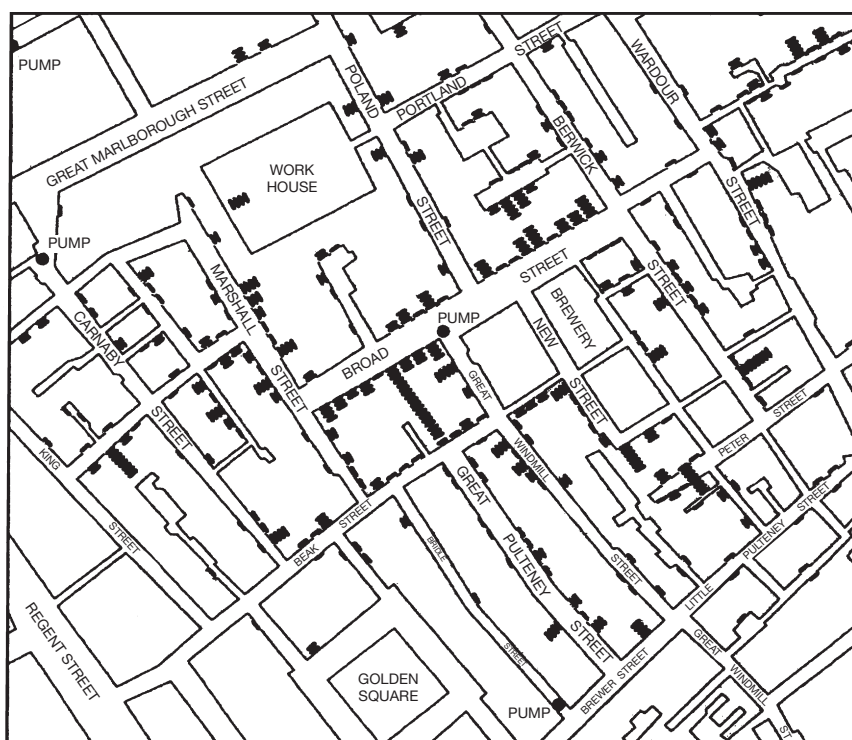


Figure 1.2 Snow's map of cholera cases in Soho, 1854.

Reproduced from Naidoo and Wills (2000) *Health Promotion: foundations for practice*, with permission from London, Baillière-Tindall.

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were not simply driven by altruistic motives. The need for a fit and healthy workforce and armed services was the main pressure for reform. A significant proportion of British army recruits for the Boer War were rejected on health grounds, many of them because of dental problems. It was reported that 6% of potential recruits were rejected because of missing or decayed teeth, and within 3 months of enlisting, 3 in every 1,000 soldiers were declared unfit because of dental problems (Gelbier 1994).

The industrial revolution and the development of mechanization influenced emerging ideas about health and disease. The lessons of the public health movement were overtaken by the growth of knowledge about the functioning of the body and the analogy of the body with machines. The engineering concept was easy to explain to lay people, but it focused health interventions on the individual rather than the population level. This approach became known as the biomedical model of health. Features of the biomedical model are presented in Box 1.4.

By the turn of the 20th century the focus of public health had shifted away from social and environmental causes of disease to a more biomedical approach, which instead emphasized behavioural lifestyle and biological influences on health. This approach therefore became dominated by a more medicalized form of practice in which immunization and screening programmes had the highest priority and were the major focus for prevention.

Box 1.4 Features of the biomedical model

- Disease orientated, with a focus on pathological change.
- Explanations for ill health concentrate on biological factors, operating at an individual level.
- Knowledge and expertise controlled by the medical profession.
- Compartmentalized and mechanistic approach to diagnosis and treatment.
- Interventionist and high-technology approach to treatment—belief in ‘magic bullets’.
- ‘Top-down’ approach—hierarchical structure.
- Centralized institutional centres of excellence—teaching hospitals.

Emergence of the new public health

In the UK, following the creation of the NHS in 1948, the health service steadily expanded in size and influence. Indeed, in most developed countries, health services expanded considerably in the second half of the 20th century. However, by the 1970s and 1980s the limitations of modern medicine were becoming increasingly evident. Medicine continued to adopt a treatment-orientated approach, but a number of other problems also emerged: health services did not appear to have any clear goals and were poorly evaluated, accountability was poor, and there was maldistribution of resources and inequality in the access and quality of health care. (The problems with health care systems will be covered in more detail in Chapter 23.)

DISCUSSION POINTS 4

- Do you think these problems of health care delivery are applicable to the current health system?
- Can you give some examples?

The limitations of modern medicine were highlighted by a selection of influential philosophers and academics whose criticisms of the current system of health care were very important in establishing the new public health movement. A synthesis of their main arguments is presented in Box 1.5.

The new public health movement has refocused attention on to the political, economic, and environmental influences on health within contemporary society. More emphasis is therefore placed upon developing a range of policy options to create a more health-promoting environment. This development requires health professionals to work collaboratively with a wide range of sectors and agencies. The improvement in health is largely dependent upon activities outside of the health services. This presents a major challenge to traditional beliefs of the role of medicine in society. A number of international reports and WHO declarations embodied the new public health approach and the refocusing on primary health care.

Box 1.5 Influential figures in the new public health movement

Rene Dubos (1979) Argued that modern society's obsession with the attainment of 'perfect health' was a 'mirage', an impossible dream. Instead proposed concept of holistic health as being a state of balance, equilibrium, and harmony with nature. Stressed the limitations of the doctrine of specific aetiology which dominates biomedical practice.

Archie Cochrane (1972) Founder of the Evidence-Based Medicine movement. Identified lack of scientific evidence for large amount of clinical practice. Stressed need to evaluate all forms of medical care with randomized controlled trial. Also stressed the importance of the caring role in medicine.

Ivan Illich (1976) Major critique of modern medicine and medicalization of life. Stressed iatrogenic 'threat to health' of medical care. Concerned by power and control of medical profession in modern society and peoples' lack of autonomy in coping with life, illness, and death.

Vincente Navarro (1976) Critical of the commercialization of health and the emphasis placed upon profit and financial gain. Stressed how the capitalist system has taken over health care as a commodity to be bought and sold. Also identified how the system defines diseases and formulates politically driven solutions that fail to challenge the underlying factors that create disease.

Aubrey Sheiham (1977) A leading dental public health academic. Highly critical of clinical dentistry and the limited use of scientific evidence in clinical decision-making. Very influential in dental policy and importance of adopting a common risk approach in oral health promotion.

Thomas McKeown (1979) Demonstrated that the major reductions in mortality in the 19th century were

due to decline of infectious diseases. Main reasons for decline were improvements in nutrition, sanitation, water supply, and reduction in family size. Medical services and discoveries had relatively small effect. Stressed that if medicine is to be effective it should be concerned with prevention as well as treatment, with care as well as cure, and with the context of sickness as well as intervention.

Nancy Milio (1986) A key figure in the field of health promotion. Coined the expression 'making the healthier choices the easier choices'. Reviewed the importance of healthy public policy and the importance of developing health alliances to promote health.

David Locker (1988) Highly prolific and distinguished dental researcher. Particular areas of interest included development of measures to assess oral health-related quality of life, effectiveness of oral health promotion interventions, dental pain and anxiety, and oral health inequalities.

Michael Marmot (2005) An internationally renowned public health academic and policy advocate. Highlighted the universal nature of the social gradient in health and identified the broader social determinants as the key causes of health inequalities. Very influential as policy advocate on health inequalities at the WHO, European Union, and with various national governments.

Geoffery Rose (2008) A leading figure influencing the development of modern public health and preventive medicine. Outlined the limitations of the traditional high-risk strategy in preventive medicine and the potential advantages of the whole-population approach in disease prevention.

Alma-Ata declaration

In 1978, the World Health Organization organized an international conference in Alma-Ata in the then Soviet Republic of Kazakhstan to review the future development of health care internationally (WHO 1978). The conference agreed an important declaration that has since set an agenda for the new public health:

Focus on prevention A shift in focus and resources is required, away from the dominant concentration on treatment towards prevention and what we now term as health promotion.

Multi-sectoral approach The promotion of health requires action in a wide range of sectors beyond the health sector. Education, agriculture,

transport, economic, housing, and welfare policies all affect health.

Appropriate technology Emphasis should be placed upon the most appropriate technology and personnel to deal with health problems.

Equitable distribution Governments and health planners must endeavour to fairly distribute those factors that influence health.

Community participation Individuals and communities should participate in all decisions that affect their health.

These concepts are fundamental to the core themes in dental public health practice.

Ottawa Charter

The first WHO international health promotion conference was held in Ottawa, Canada, in 1986 to review the concepts and principles of health promotion (WHO 1986). This was a significant and fundamental turning point in global health promotion policy. The Ottawa Charter remains the seminal guidance document on health promotion. The Ottawa Charter identifies three basic strategies for health promotion. These are advocacy for health to create the essential conditions for health; enabling all people to achieve their full health potential; and mediating between the different interests in society in the pursuit of health. These strategies are supported by five priority action areas as outlined for health promotion:

- 1 Build healthy public policy:** focusing attention on the impact on health of public policies from all different sectors, and not just the health sector
- 2 Create supportive environments for health:** recognizing the impact of the social, physical, and political environment on health and identifying opportunities to make changes conducive to health
- 3 Strengthen community action for health:** empowering individuals, families, and communities to take action to promote health and reduce inequalities

4 Develop personal skills: moving beyond the transmission of information, to promote understanding and health literacy, through the development of personal, social, and political skills that enable individuals to take action to promote health

5 Reorient health services: refocusing attention away from only providing curative and clinical services towards the broader goal of health improvement and disease prevention.

Millennium development goals

The aim of the millennium development goals is to encourage development by improving social and economic conditions in the world's poorest countries (UN 2000). Established in 2000 at the Millennium Summit, all 193 United Nation member states and over 20 international organizations have now agreed to meet eight international development goals by 2015.

The goals are:

- 1** Eradicating extreme poverty and hunger
- 2** Achieving universal primary education
- 3** Promoting gender equality and empowering women
- 4** Reducing child mortality rates
- 5** Improving maternal health
- 6** Combating HIV/AIDS, malaria, and other diseases
- 7** Ensuring environmental sustainability
- 8** Developing a global partnership for development

WHO Commission on the Social Determinants of Health

In recognition of the growing concern over inequalities in population health, the WHO has coordinated global action to tackle this major problem. In 2008 the WHO published the final report on the Commission on the Social Determinants of Health (CSDH) which outlined a range of local, national, and international

policy initiatives to reduce health inequalities (WHO 2008). The report highlighted that health inequalities are principally caused by social, economic, and political factors, known as the social determinants of health.

There are three principles of action outlined in the report:

- 1 Improve the conditions of daily life**—the circumstances in which people are born, grow, live, work, and age.
- 2 Tackle the inequitable distribution of power, money, and resources**—the structural drivers of those conditions of daily life—globally, nationally, and locally.
- 3 Measure and understand the problem**—evaluate action, expand the knowledge base, develop a workforce that is trained in the social determinants of health, and raise public awareness of the underlying causes of health inequality.

Core themes of dental public health practice

Dental public health is a fundamental subject for dental students to study, but, unlike the majority of subjects in the dental curriculum, dental public health aims to broaden students' focus and encourage a critical and questioning approach to the delivery of dental care. This approach is based upon understanding and applying core public health themes to the delivery of dental care. These themes are now discussed.

Concepts of health

As health professionals, it is important that dentists have a clear understanding of what is meant by oral health. What dimensions would be included within a definition of oral health? Professional and public concepts may differ over the meaning and selected priorities. This may have important implications for the focus of dental services, goals, and priorities set, and the best process of evaluating interventions.

Determinants of health

To promote and maintain oral health, it is essential that the factors that determine the health status of individuals and populations are clearly identified and the appropriate action implemented. Public health research and policy analysis has highlighted the significance of social, economic, and environmental factors in determining health status, and the need to work collaboratively with the range of sectors that influence these factors. At the root of understanding the socio-environmental determinants is the practical concept that, in order to change people's behaviour, one has to change the environment.

Concepts of need

One of the greatest challenges facing health care systems internationally is meeting the health needs of their populations with the available resources. This complex political and clinical problem has first to consider how to define need. Bradshaw (1972) has developed a taxonomy that distinguishes four types of need:

Normative needs These are defined by professionals, based upon an assessment against an agreed set of criteria.

Felt needs These are the needs that people perceive as being important. They are subjective feelings of what people really want.

Expressed needs These arise from felt needs but are expressed in words or action and therefore become demands. People express a need when they ask for information or when they use services.

Comparative needs This is when an individual or group is compared with a similar individual or group and is considered lacking with regards to services or resources.

Inequalities in oral health

Within any given population, health will vary for a variety of reasons. Some health differences may be considered acceptable when they are seen as being inevitable

consequences of age or sex differences. Other health differences are caused by social, economic, and political factors which may affect certain members of society more than others purely based upon opportunity and access to appropriate resources within society. These health inequalities are now considered as unjust, unfair, and unacceptable (WHO 2008). The epidemiology of dental diseases reveals that disease levels vary greatly across socio-economic groups (Locker 2000; Petersen *et al.* 2005). What can dentists do to reduce oral health inequalities? One of the key challenges to dental public health is implementing effective strategies to do just this.

Preventive approach

Although 'prevention is better than cure', in reality prevention is given far less priority than the treatment of existing disease. Public health, however, seeks to develop effective preventive measures at both individual and population levels. Effective prevention requires an understanding of the key influences on health and identifying opportunities for appropriate intervention.

Quality of dental care

Although oral health is determined by a wide range of factors beyond purely contact with dental services, it is still important that high-quality dental services are developed to best meet the needs of their local populations. From a dental public health perspective, quality of dental care encompasses a range of issues beyond solely clinical concerns. Issues such as access to care, responsiveness to individuals' concerns, and cost effectiveness all need to be addressed. Dental public health principles are relevant to clinical governance activities which encompass evidence-based dentistry.

Evidence-based practice

A core component of quality is the effectiveness of care. Evidence-based practice is central to clinical practice, and all clinical decisions should be based upon a critical appraisal of the available scientific evidence. Studying clinical epidemiology provides the

understanding and skills to develop evidence-based practice.

Implications of dental public health for practice, research, and teaching

Around the world, governments have placed public health at the centre of their health strategy. Policies aimed at reducing health inequalities and addressing the social, economic, and environmental determinants of health are being developed and implemented. This public health agenda will directly impact upon the future development of dental services.

Dental public health is relevant to all aspects of clinical dental care, from the assessment of need, through the development of care, to the evaluation of treatment. The following chapters will introduce and explore the range of topics that are key elements of this subject.

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2 Determinants of health

CHAPTER CONTENTS

Introduction

Appreciating the broader picture

Health inequalities and social gradient

Social determinants of health

Determinants of oral health

Limitations of the lifestyle approach

Need for upstream action

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Describe the underlying range of factors that determine people's health.
- Outline the nature of, and explanations for, inequalities in health.
- Describe the basis for the common risk factor approach.
- Outline the need for an upstream public health approach in promoting population health and reducing inequalities.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- Definitions of health (Chapter 3).
- Public health approaches to prevention (Chapter 4).
- All chapters in the prevention and oral health promotion section (Chapters 8–16).

Introduction

For health services to deliver effective prevention and treatment, a detailed understanding of the factors influencing health is critical. These factors are known

as the determinants of health. Failure to address the underlying causes of disease in society will mean that sustainable improvements in the health of the population and a reduction in health inequalities will never be achieved. Tackling the contemporary determinants of health across society is a core function of public health and has now become the focus of government health policy in many parts of the world (WHO 2008).

Appreciating the broader picture

Many clinicians often feel frustrated when their advice to patients on ways of staying healthy is apparently ignored. Why don't people stop smoking when they know the serious health risks of the habit? Why do some parents continue to give their children sweets when they have been given clear advice on the harmful effects on the child's oral health? It is important for all health professionals to understand the factors influencing their patients' choices and actions. Clinicians equipped with this knowledge are more likely to be effective at supporting their patients and enjoying their professional work.

When asked what factors determine health, many people would probably highlight the importance of modern medicine. The use of antibiotics, high-tech equipment, and surgical advances might all be given as the most important reasons for improvements in health that have been achieved in the last hundred years. Why is modern medicine credited with such achievements and is this a true reflection of reality?

Professor Thomas McKeown, a pioneer in public health research, conducted a detailed historical analysis of the reasons for the steady reduction in mortality rates that occurred in westernized countries during the last century (McKeown 1979). In his classic analysis he investigated changes in mortality rates for different conditions. As can be seen in Figure 2.1, with infectious diseases such as tuberculosis, whooping cough, and measles, significant reductions in mortality rates occurred long before treatments and vaccination programmes were even introduced.

McKeown concluded that the most important reasons for the decline in mortality rates were broader social changes in society such as improvements in living conditions and sanitation, access to clean water, better nutrition, and reduced family size (McKeown 1979). Indeed, it has been claimed that medical treatments contributed only 17% to the gain in life expectancy that occurred in the 20th century (Tarlov 1996). Figure 2.2 highlights that, by 1948 when the NHS in the UK was established, mortality rates had already declined greatly.

Modern medicine and dentistry have an important role to play in caring for people and improving their quality of life. However, the underlying importance of the social, economic, environmental, and political factors that determine the health of the population need to be recognized.

Health inequalities and social gradient

What do we mean by inequalities in health? It would be unrealistic to expect everyone in society to have the same level of health. For example, a teenager is far more likely to be physically fit than a man aged 75.

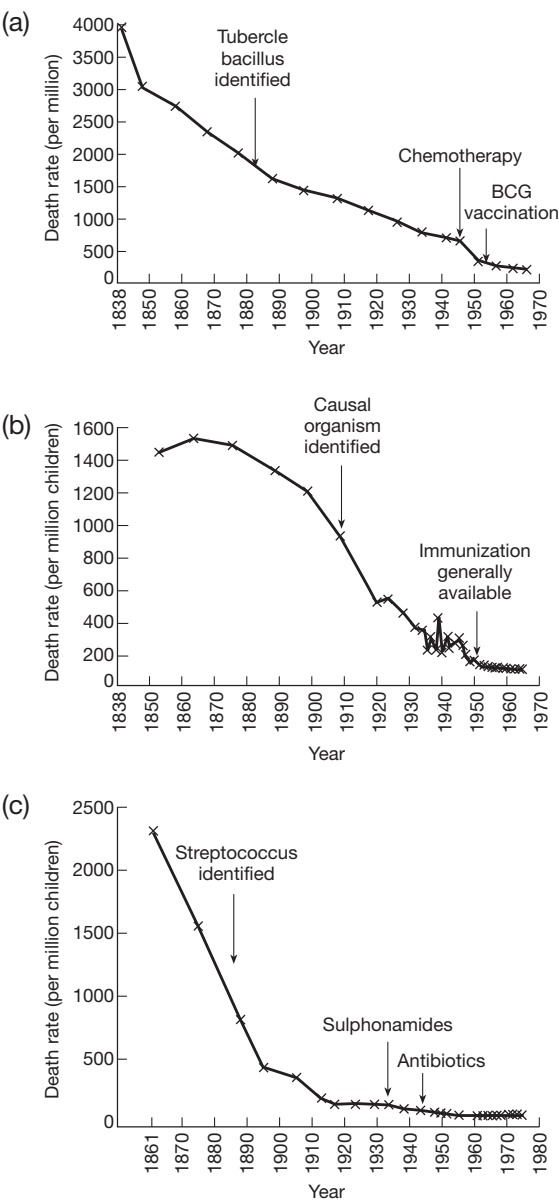


Figure 2.1 The role of health care in reducing mortality. (a) Respiratory tuberculosis: death rates, England and Wales. (b) Whooping cough: death rates of children under 15, England and Wales. (c) Measles: death rates of children under 15, England and Wales. Reproduced from McKeown and Lowe 1974, *An Introduction to Social Medicine*, with permission from Blackwell Science Ltd.

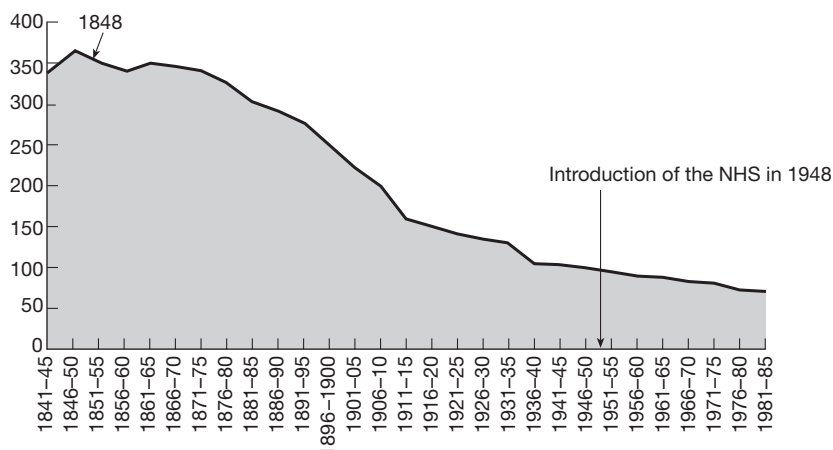


Figure 2.2 Mortality trends, 1841–1985, England and Wales. The Standardized Mortality Ratio (SMR) is an index that allows for differences in age structure. Values above 100 indicate higher mortality than in 1950–52, and values below 100 indicate lower mortality.

Reproduced from Harrison D, *Integrating health sector action on the social and economic determinants of health*. Reviews of Health Promotion and Education Online: Verona Initiative, 1998 with permission.

DISCUSSION POINTS 1

Peter is 18 years old and will soon be leaving school to study law at Oxford. He lives with his parents who are both accountants working in the City of London. They have a very comfortable standard of living. Peter is a confident, bright, and popular individual. His oral health is very good. He has only one filling and his oral hygiene is sound. He successfully completed a 3-year course of orthodontic treatment last year. He attends the family dentist on a regular basis.

Jane and Steve are both in their mid-twenties and have two children aged under 5 years. Steve left school with no qualifications and has never been able to find any permanent work. Jane has a part-time job in the local supermarket. Their oldest child, Britney, has had toothache for several weeks, and recently attended the local hospital where she had six teeth removed under a general anaesthetic. Both Jane and Steve are frightened

of going to the dentist but are very anxious that their children should have good teeth.

Tom, a retired joiner, is 70 and lives in a council flat with his wife Mary. He has smoked for the last 55 years and enjoys the odd whisky with his mates. He is edentulous and has worn his present set of dentures for 6 years. For the last 9 months he has noticed a white mark on the side of his tongue, but as this has not caused him any real pain or discomfort he hasn't bothered going to the doctor. He last saw a dentist when he had his dentures fitted.

List all the factors influencing these individuals' general and oral health.

Group these different factors under suitable subheadings.

How do these different factors relate to each other?

Women may suffer from cervical cancer, whereas this is obviously not a health problem affecting men. These differences are due to the effects of ageing or biology, and are therefore unavoidable and inevitable. In contrast, health inequalities refers to differences that are avoidable, and considered both unacceptable and

unfair in modern society (Whitehead 1992). Reducing health inequalities is therefore a matter of fairness and social justice (Marmot 2010).

A considerable international body of research evidence has explored patterns of health inequalities in different population groups (Box 2.1). In the UK the first

major review on health inequalities, the Black Report, was undertaken in the early 1980s and highlighted that for almost all reported conditions, mortality and morbidity rates were higher in people from lower socio-economic groups (Townsend and Davidson 1982). At this time the UK government, led by Mrs Margaret Thatcher, denied the importance of health inequalities, and indeed attempted to stop the report from being published to avoid any political embarrassment. This

Box 2.1 The extent of inequalities in health—life expectancy (in years) at birth for men

UK Glasgow (Calton)	54
India	62
US Washington DC (Black)	63
Philippines	64
Lithuania	65
Pland	71
Mexico	72
Cuba	75
US	75
UK	77
Japan	79
US Montgomery County (White)	80
UK Glasgow (Lenzie N)	82

demonstrates the close connection between health and politics. Later reviews compiled more evidence on the nature and extent of health inequalities in the UK (Acheson 1998; Whitehead 1988). The most recent comprehensive review of inequalities was undertaken by Professor Sir Michael Marmot and demonstrated that although, overall, levels of health had greatly improved over recent decades, health inequalities have remained, and indeed widened (Marmot 2010). Health inequalities are, however, not merely differences in health status between the rich and poor in society. The Marmot Review highlighted evidence on what is known as the social gradient in health—individuals at the top of the social hierarchy enjoy better health than those immediately below them, and as one goes down the social scale health deteriorates further in a step-wise and consistent graded fashion (Marmot 2010). The social gradient is consistently found for most common diseases and causes of death, in both men and women, and across the entire lifespan from early life to old age (Figure 2.3). Indeed, the social gradient is not only a British problem, it is a universal phenomenon found across the globe, in both developed and developing countries (Marmot 2005; Victora *et al.* 2003; WHO 2008).

A substantial body of dental scientific literature from many countries has also shown that the oral

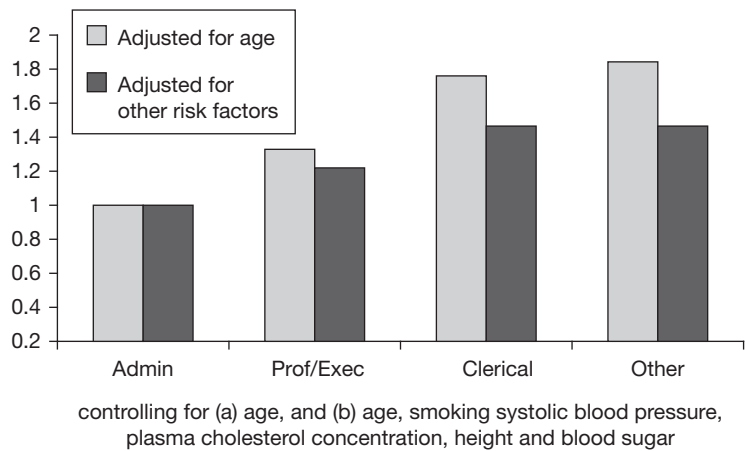


Figure 2.3 Whitehall CHD mortality 25 year follow-up. Reproduced from van Rossum CT, Shipley MJ, van de Mheen H, Grobbee DE, Marmot MG (2000). Employment grade differences in cause specific mortality. A 25 year follow up of civil servants from the first Whitehall study. *J Epidemiol Community Health*; **54**(3):178–84, with permission from BMJ Publishing Ltd.

health of lower socio-economic groups is worse than that of their more affluent contemporaries (Locker 2000; Petersen 2009; Watt and Sheiham 1999). Oral health inequalities exist for different clinical conditions, such as caries, periodontal disease, and oral cancer, as well as for subjective oral health outcomes. Epidemiological evidence from many diverse countries and different populations has also shown that social gradients in oral health exist (Sheiham *et al.* 2011). At different points in the life course from early life to old age, oral diseases are socially patterned across the entire social hierarchy. Oral diseases are directly related to socio-economic position in a step-wise graded fashion. Figure 2.4 shows levels of edentulousness by social position amongst a national sample of older English adults. This social patterning of oral health outcomes is very similar to the social gradients found in general health. Indeed, the social

gradients in general and oral health outcomes are almost identical, indicating shared common pathways (Sabbah *et al.* 2007). What factors are responsible for health inequalities and such consistent social gradients across diverse health outcomes and in different populations?

Social determinants of health

In many countries around the world, governments and the health professions are now increasingly acknowledging the importance of addressing the social determinants of health inequalities (Marmot 2010; Petersen and Kwan 2011; WHO 2008). Public health research has highlighted the underlying importance on health and disease of social, economic, environmental, and political factors (Marmot and

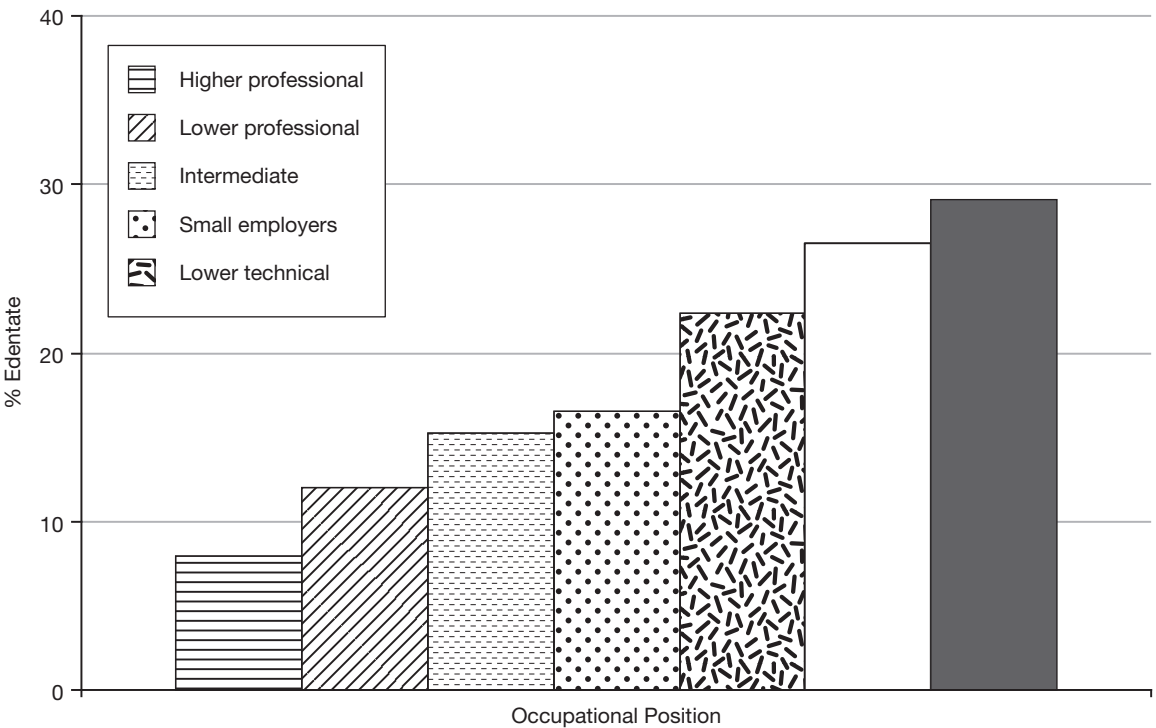


Figure 2.4 Age-standardized prevalence of edentulousness by occupation.
Tsakos, G, Demakakos, P, Breeze, E, Watt, RG. (2011). Social gradients in oral health in older adults: findings from the English Longitudinal Survey of Ageing. *American Journal of Public Health*, **101**, 1892–9.

Wilkinson 1999; WHO 2000, 2008). Social conditions and structure are the true aetiological agents in most chronic diseases (Smedley and Syme 2000). Social determinants of health are ‘the structural determinants and conditions of daily life responsible for a major part of health inequities between and within countries’ (WHO 2008), the causes of the causes, the ‘fundamental structures of social hierarchy and the socially determined conditions these create in which people grow, live, work, and age’ (Marmot 2007). Longitudinal research has shown how adverse social conditions and events have a particularly significant effect at critical points across the life course and negatively impact upon health in later life and across subsequent generations (Kuh and Ben Shlomo 2004). Figure 2.5 presents an overview of the complex range of factors that determine the health status of individuals and populations.

DISCUSSION POINTS 2

Consider housing, one of the factors listed in Figure 2.5. Describe the range of health problems that may be caused by poor housing.

Determinants of oral health

Oral diseases, inequalities in oral health, and the social gradient in oral health outcomes all need to be understood within the broader social determinants agenda. One of the major limitations with modern dentistry is its isolation and separation from general health. Dental research has largely focused on exploring the biological, behavioural, and clinical aetiological mechanisms and pathways of oral diseases. The limitations of this narrow approach have increasingly been recognized, and research organizations such as the International

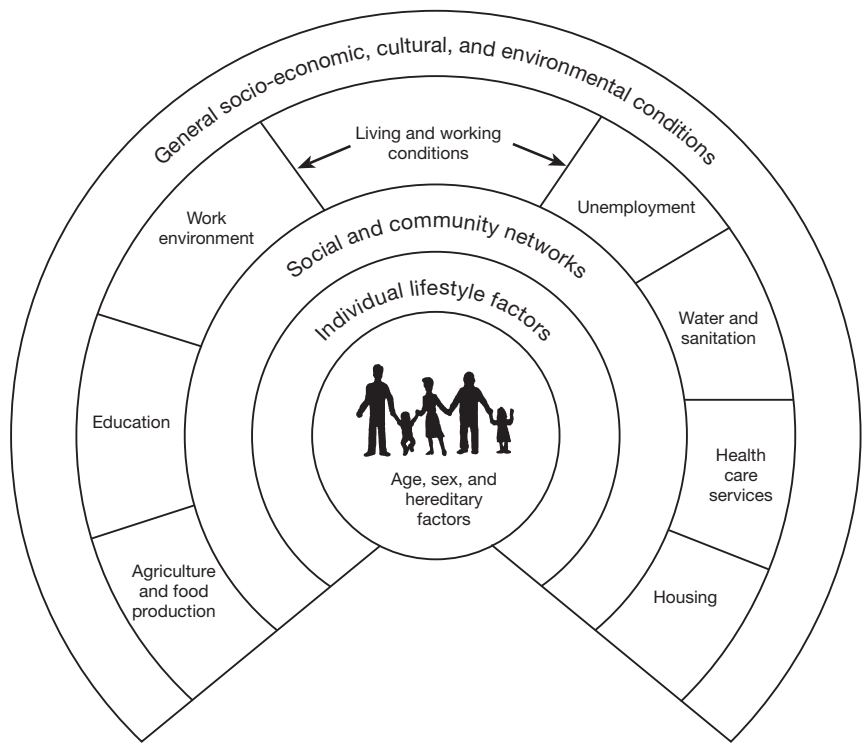


Figure 2.5 Determinants of health. Dahlgren and Whitehead devised a diagram to show the general factors that affect health. Based on Dahlgren, G., *European Health Policy Conference: opportunities for the future. Volume II – Intersectoral action for health*. Copenhagen, WHO Regional Office for Europe, 1995.

Association for Dental Research (IADR) now advocate the need to adopt a broader social determinants approach in dental research (Williams 2011). An increasing body of research evidence demonstrates how social, economic, environmental, and political factors determine oral diseases and patterns of oral health inequalities (Marmot and Bell 2011; Newton and Bower 2002; Petersen and Kwan 2011; Tomar 2012; Watt 2002; Watt and Sheiham 2012). Figure 2.6 outlines the complex interrelationships between structural and intermediary determinants on oral health outcomes. To improve patients' and populations' oral health, and most importantly to reduce inequalities, requires action on the social determinants.

DISCUSSION POINTS 3

Let's consider an oral health problem such as oral cancer. Based upon the issues raised in this chapter so far, describe the determinants of this condition.

Attempt to draw a pictorial image of the various factors and how they relate to each other.

Limitations of the lifestyle approach

Globally, oral health preventive strategies have been dominated by a clinical and behavioural approach directed at individual patients. This approach has used chair-side clinical measures such as topical fluorides and fissure sealants, and health education aimed at changing harmful oral health behaviours. Particular focus has been placed upon influencing oral health behaviours, such as patterns of dental attendance, oral hygiene practices, sugars consumption, and to a lesser extent tobacco and alcohol use. As outlined in Chapter 9, this approach may produce short-term benefits but fails to achieve sustainable improvements in oral health or to reduce inequalities.

What is the limitation of a lifestyle approach in tackling oral health inequalities? Health behaviours alone do not account for or explain differences in oral health inequalities (Sabbah *et al.* 2009; Sanders *et al.* 2006). Solely focusing on changing the lifestyle of individuals

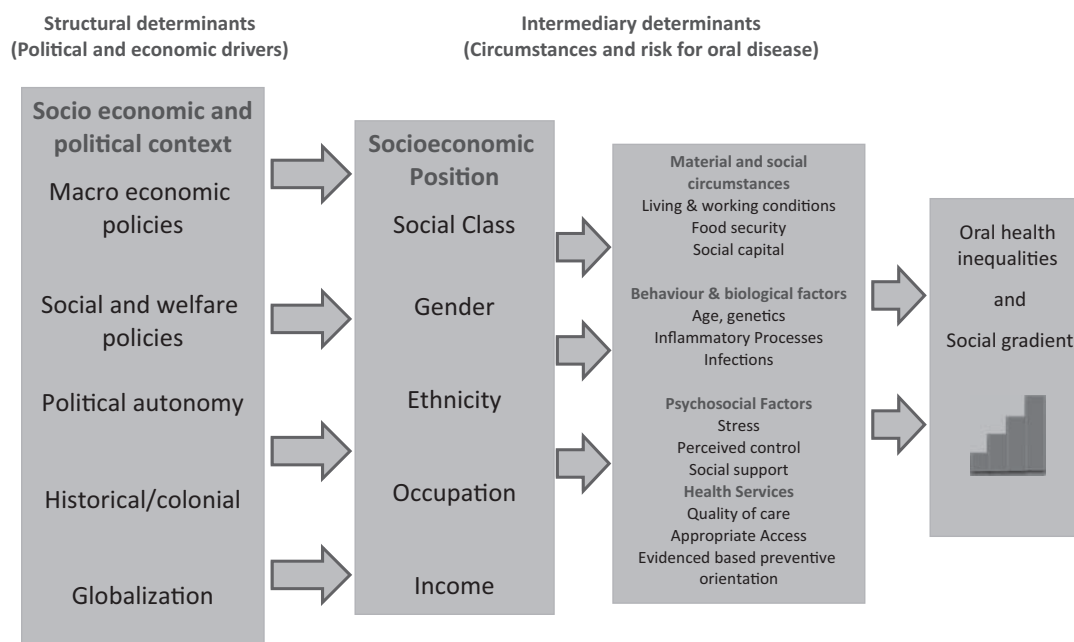


Figure 2.6 Conceptual framework for social determinants of oral health inequalities.

Reproduced from Watt RG, Sheiham A. (2012). Integrating the common risk factor approach into a social determinants framework. *Community Dentistry and Oral Epidemiology*, 40, 289–96, with permission from Wiley.

is both ineffective and very costly (Syme 1996). Such an approach diverts attention away from the causes of the causes, the underlying conditions that cause disease (Sheiham 2000). It is incorrect to assume that lifestyles are freely chosen and can be easily changed by everyone. People respond to stress and poor social circumstances by smoking, drinking heavily, comfort-eating, and risk-taking. Health knowledge and awareness are of little value when resources and opportunities to change do not exist. Behaviours are enmeshed within the social, economic, and environmental conditions of living (Graham 1999). Individuals' behaviours are therefore largely determined by the conditions in which they live (Sheiham 2000). Focusing solely on changing lifestyle can be considered a 'victim blaming' approach, which not only is ineffective but also may widen health inequalities (Schou and Wight 1994).

Need for upstream action

A radically different approach is now needed to reduce oral health inequalities and promote population oral health. Clinical preventive measures and behavioural approaches are not effective at tackling oral health inequalities. Instead, coordinated and integrated action is needed on the underlying social determinants of health, that is, upstream action to improve living, working, and social conditions. Chapter 8 details the principles of oral health promotion strategies. What role do oral health professionals have within this broader framework? Most clinicians do not have any direct influence over factors such as housing quality, government policy, and local planning decisions, but these factors clearly do have an effect on health. Therefore it is very obvious that health professionals need to work in partnership with a range of different organizations and agencies to effectively promote health. Working across professional boundaries is a challenging task that requires appropriate skills in communication and team working.

A key task for public health professionals is to act as advocates for change to promote health and reduce inequalities. Advocacy involves influencing decision- and policy-makers to ensure that health is placed upon their agendas. A range of government initiatives have been launched in recent years to reduce health and

social inequalities. A key to the success of these developments will be how effective the partnerships are in working together for sustainable change.

DISCUSSION POINTS 4

To reduce smoking rates amongst young people, what agencies and organizations would have an important role to play?

Conclusion

A fundamental issue of great importance to all health professionals is the need to identify and tackle the causes of disease in society. The promotion of health and a reduction in health inequalities requires effective action on the determinants of health. This chapter has given an overview of the social determinants of health and stressed the limitations of a lifestyle approach. The nature of, and explanations for, health inequalities have been presented. The importance of adopting an integrated upstream approach to the promotion of oral health has also been highlighted.

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3 Definitions of health

CHAPTER CONTENTS

Introduction

Definitions of health, disease, and disability

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Further reading

By the end of this chapter you should be able to:

- Describe the concepts of health, disease, illness, and ill health.
- Understand the different concepts of health, disease, illness, ill health, and disability held by health care professionals, patients, and the public.
- Outline the influence the concept of health may have on need and service use.
- Discuss how the gap between professional, patient, and public concepts of health may have an impact on how health care is delivered and used.

The chapter links with:

- Determinants of health (Chapter 2).
- Overview of epidemiology (Chapter 5).
- Planning dental services (Chapter 21).
- Problems with health services (Chapter 23).

Introduction

In any discussion of public health, it is necessary to be able to define what is meant by the term 'health'. The promotion and maintenance of health should be a goal of health services and thus a clear definition is

essential. At a personal level we can distinguish the difference between feeling well and feeling ill, but converting this to an index that measures health and illness in a population is far more complex (Hart 1985). Health, disease, and disability mean different things to different people at different times, and providers of health care may hold very different views compared to the users of health care. Definitions of what constitutes health and illness 'will vary within cultures, subcultures and communities and even within households' (Scambler 2008, p. 41). The different ways in which people think about health influences what they do to protect their health, when they decide to use health services, and how they use health services. How health is defined also affects health care professionals' attitudes to patients and how health care is organized. Different disciplines such as psychology, sociology, and epidemiology, for example, also construct health in different ways and they use different approaches and methods to study and understand health (Naidoo and Wills 2008).

This chapter will briefly review the commonly used definitions of health, disease, illness, ill health, and disability. It will consider some of the implications these differences have for the measurement of health, the assessment of need, and how health care is delivered and used.

Definitions of health, disease, and disability

Health

Health can be defined objectively as normal functioning of the body systems and processes. It can be measured objectively, e.g. at an individual level the measurement of blood pressure against a 'normal' level, or in populations as the prevalence of people with or without a condition, for example the proportion of 5-year-olds who are caries free. Health may also be defined subjectively by age, gender, or social class. For example, young people may talk about health in terms of being physically fit and being able to participate in sport; older people may talk about health in terms of ability to undertake normal daily activities and tasks. Health can have a negative meaning, as in the 'absence of disease' (central to the biomedical model of health); it may also have a positive meaning, as in the concept of 'well being' in WHO definitions of health (WHO 1946, 1984). Health can also be seen as incorporating many

Box 3.1 The dimensions of health

- 1 Physical health: concerned with the functioning of the body, e.g. fitness.
- 2 Mental health: the ability to think clearly and coherently, e.g. feeling able to cope.
- 3 Emotional health: the ability to recognize and express emotions such as fear, joy, grief, e.g. feeling loved.
- 4 Social health: the ability to form and maintain relationships, e.g. feeling supported.
- 5 Spiritual health: concerned with either religious beliefs and practices or personal creeds and principles of behaviour, e.g. feeling there is a purpose to life.
- 6 Sexual health: concerned with acceptance and expression of sexuality.
- 7 Societal health: a person's health is closely linked to the environment he or she lives in, basic infrastructure, and how society is structured.
- 8 Environmental health refers to the people's living conditions, such as local physical environment.

(Modified from Naidoo and Wills 2009.)

categories ranging from individual organs (e.g. healthy hearts), the individual (healthy minds and healthy bodies), environmental aspects (healthy housing), and the social (social networks) (Naidoo and Wills 2008). Naidoo and Wills (2009) have outlined the dimensions that they consider to be part of a complete view of health, termed 'a holistic concept of health'. These dimensions may influence health separately or may interact together to influence health (see Box 3.1).

In 1946 the WHO (1946) attempted to grasp the multi-dimensionality aspects of health in their definition of health as:

Health is a complete state of physical, mental and social well-being and not merely the absence of disease or infirmity.

DISCUSSION POINTS 1

Think back over the last year. Estimate how much of the time this description might have been applied to you. What were the factors that stopped you enjoying full health as outlined in this definition? Again, thinking back over the last year, how would you rate your health compared with the rest of society? Is this a realistic definition of health? If not, why not?

The original WHO definition was criticized as being unrealistic, unworkable, and unachievable. Based upon this definition, almost everyone could be categorized in some way as 'un healthy'. The definition did, however, move beyond the biomedical concept of 'an absence of disease'. The WHO definition also acknowledged that health had other dimensions beside the physical. In the 1980s, the WHO definition of health was restated further to incorporate concepts of health that focused on coping and capacity, on aspiration to attain potential and positive health (Naidoo and Wills 2008). This example from 1984 (WHO 1984) illustrates the incorporation of these newer concepts:

Health is the extent to which an individual or group is able, on the one hand, to realize aspirations and satisfy needs; and on the other hand, to change or cope with the environment.

Health is, therefore, seen as a resource for everyday life, not an object of living; it is a positive concept emphasizing social and personal resources, as well as physical capacities.

The notion of positive health, although enshrined in the WHO definitions, is a vague concept which itself has not been defined clearly. Most definitions of positive health include the idea of a continuum between positive and negative health, but in reality the idea is very difficult to operationalize (Locker and Gibson 2006). It is also very important to note that the dimensions referred to are not separate but are in fact part of a whole. The importance of each is likely to vary at different times in life. For example, the need to form social relationships is of particular importance when leaving home for the first time, while for the majority of people their physical health is of little concern at this time but becomes more so later in life.

The western scientific model of health, also called the biomedical model of health, has dominated the training of health care professionals, the organization of health care, treatment of patients, and prevention of diseases. The focus is on why people are ill; disease is seen to be a product of biological abnormalities, and management of disease works by a system of opposites, i.e. applying opposite forces to correct the sickness (Naidoo and Wills 2009). This narrow and disease-orientated view of health has also influenced the public’s view of health and indeed how health is presented in the media.

The limitations of modern medicine and the biomedical model were highlighted by a succession of academics and philosophers (summarized in Chapter 1). The adoption of a multi-dimensional view of health in the 1980s meant that the social aspects of health became accepted and incorporated into the new public health movement which mostly adopted a social model of health. In this view, health was seen as a product of social, economic, and environmental determinants. Some adopted a behavioural model of health, which was a development of the medical model of health. In the behavioural model, health is produced by positive health behaviours and lifestyle choices. Table 3.1 summarizes the features of the biomedical and the social models of health.

Table 3.1 The biomedical and social models of health

Biomedical model	Social model of disease
Health is the absence of disease	Health is a product of social, biological, and environmental factors
Health services are focused on treating the sick and disabled	Services emphasize all stages of treatment and prevention
Specialist medical care is highly valued	Less emphasis on medical specialists and more emphasis on self-help and community activity
Health workers treat and sanction the sick role	Health workers enable people to take control over their own health
The pathogenic focus emphasizes the need to find a biological cause	A salutogenic focus emphasizes the need to understand why people are well

Reproduced from Naidoo and Wills 2009, p. 8 Table 1.1 The medical and social model of health. From Chapter 1 Concepts of Health. In: *Foundations for Health Promotion*, 3rd edition. Baillière Tindall Elsevier: London.

So, modern public policies on health have moved from the simple biomedical model and behavioural model of health to a social model of health. In this view, health has a number of dimensions; it is defined positively in terms of social, psychological, and physical functioning and it incorporates notions of resilience and coping (Naidoo and Wills 2008).

DISCUSSION POINTS 2

Outline the range of factors that determine how an individual would define their health.

Disease

Disease can be described as named pathological entities diagnosed by means of objective tests and clinical signs, for example cancer and caries. Disease may be caused by factors outside the body, e.g. infections, or

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by factors inside the body, e.g. diabetes. Diseases are determined by professionals based upon information collected in history-taking and through clinical investigations and tests. The concept of disease is considered to be objective in nature; however, definitions of disease are not static and they are also influenced by societal and cultural factors. Chapter 2 provides a description of and explanation for the social patterning of health and disease.

DISCUSSION POINTS 3

On a scale of 1 to 10, with 1 indicating most definitely a disease and 10 indicating the condition is most certainly not a disease, score the following conditions:

- Alcoholism
- Acne
- Gingivitis
- Post traumatic stress disorder
- Hairy tongue
- Depression

Compare your scores with other members of your class.

What factors influenced your decisions?

What are some implications of the results of this exercise?

Illness

Illness refers to the subjective response of the individual to being unwell. It refers to 'loss of health', how the person feels, and what effect this has on his or her normal everyday life (Naidoo and Wills 2009). It is usually reported in terms of symptoms.

Ill health

Illness and disease are clearly not the same. A person can have a disease and have no symptoms, for example, periodontal disease. It is possible for disease and illness to coincide and it is then termed ill health. For example, if a person reports symptoms of bleeding gums and loose teeth which is later confirmed as periodontal disease (by the presence of clinical attachment

loss and pocketing), then disease and illness could be said to coincide. Ill health is an 'umbrella term used to refer to the experience of disease plus illness' (Naidoo and Wills 2009).

Sick role

Up until the 1950s, the presence of illness was something that was seen to be beyond an individual's control (Scambler 2008). However, Parsons introduced the concept of illness as a type of '*deviance*' because its presence prevented an individual from fulfilling their normal or usual social role. It became important that the behaviour became controlled, through the prescription either of the social roles of the sick or of the health care professional (Scambler 2008). In Parsons' view, the sick role was a temporary state and consisted of two rights for the sick, when they could be exempted from their normal social role and they could not be blamed for their condition. In return, the sick were obliged to fulfill two obligations: they must want to get better as soon as possible and seek and adhere to 'competent' medical advice if this was necessary. People who were not seen to fulfil these obligations had their rights to the sick role withdrawn. The sick role can be applied readily to a bout of flu or a dental abscess. It is more difficult to apply in the case of a chronic ongoing condition such as arthritis, where the social obligations may be difficult to avoid in the long term (Naidoo and Wills 2008). Health care professionals therefore have an important role in determining who is legitimately sick and who is not. They thus exert more power in the professional and patient relationship (an asymmetrical power relationship). This is acceptable if they put the patient's best interests first and behave altruistically, but if they are seen as a group trying to influence the organization of services and rewards, then the imbalance in the professional–patient relationship becomes problematic (Naidoo and Wills 2008). The concept of the sick role has changed since Parsons' original thesis, partly in response to economic crisis and the need to ration health care. The crisis in funding, for example, is sometimes now interpreted as patients making unrealistic demands on health care. Emke

(2002) suggests that the new elements of the sick role now include the ideas that: a patient is responsible for his/her illness (both cause and its cure); s/he must not use too many medical resources; s/he must get better sooner so as to consume fewer state resources; health is a commodity rather than a condition, i.e. it can be bought; and patients may not be trusted, i.e. they tend to abuse the medical system by overusing resources or using resources when they are in fact well).

DISCUSSION POINTS 4

How useful is the social role in accounting for:

- 1 a person with a dental abscess?
- 2 a person with major aphthous ulceration?
- 3 a person with burning mouth syndrome?

Disability

In order to provide health and social care that is appropriate and acceptable to people with a disability, it is important to have an understanding of what disability is, what it is like to live with chronic illness, and its impact on daily life (Locker 2008). The prevalence of chronic illness is high; in the UK, for example, it is estimated that over 11.5 million people have some form of disability. This rises with age, with 6% of children affected compared to 15% of adults of working age and 45% of adults of state pensionable age (Office for Disability Issues 2012). Women are slightly more affected than men, and people with a disability are more likely to live in poverty and to have fewer educational qualifications and opportunities compared to people without disability.

The term chronic illness encompasses a wide range of conditions, but what they have in common is 'that they are long term and have a profound influence on the lives of the sufferers' (Locker 2008, p. 84). They also confer considerable disadvantage and deprivation. Attempts to define disability have been contentious and there are two clear schools of thought: one based on the International Classification of Impairments, Disabilities, or Handicaps (ICIDH) (WHO 1980;

Box 3.2 ICIDH classification

Impairment: any loss or abnormality of psychological, physiological, or anatomical structure or function.

Disability: a restriction or lack (resulting from an impairment) of ability to perform an activity in a manner or within range considered normal for a human-being.

Handicap: a disadvantage for a given individual, resulting from an impairment or a disability that limits or prevents the fulfillment of a role that is normal (depending on age, sex, and social and cultural factors) for that individual, i.e. the broader social and psychological consequences of living with a disability.

Reproduced from Locker D (2008) Living with chronic illness. Chapter in: *Sociology as applied to medicine* (ed. Scambler G). Saunders Elsevier: London, p. 86.

Wood 1980; Simeonsson *et al.* 2000) and the other on the social model of Disability (Bickenbach 1999).

The ICIDH model was an attempt to classify the consequences of disease into three concepts: impairment, disability, and handicap. The terms are defined in Box 3.2. Associated with this definition was a linear model of impairment, disability, and handicap (Figure 3.1). Part of the problem with the initial linear model was the implication that the person with impairment continued to get worse until disability and then handicap occurred. In reality some people with an impairment may never progress to disability and there is no necessary relationship between severity of impairment and severity of any subsequent disability and/or handicap that arises (Locker 2008). The 1980 ICIDH model was criticized because it portrayed disabled people as poor and tragic (Oliver 1990). The model also had an uncritical view of what was 'normal', it failed to take account of social subcultures (i.e. gender), it stressed biology, and it failed to highlight the environment as a factor in the experience of disability (e.g. emphasizing you do not have the use of your legs rather than there is no lift to get you to the second floor (Scambler *et al.* 2013)). The ICIDH was essentially a medical model of disability, where an individual with an impairment needed a medical intervention to help them adapt to society. As with the sick role, the

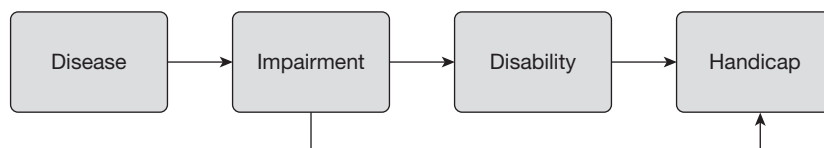


Figure 3.1 The linear model of disease and its consequences.

Reproduced from Locker D (2008) *Living with chronic illness*. Chapt in: *Sociology as applied to medicine* ed (Scambler G). Saunders Elsevier: London.

relationship between the medical profession and disabled person is asymmetrical.

The disability rights movement challenged the ICIDH and indeed many of the long-held assumptions about disability. In 1976 the Union of the Physically Impaired Against Segregation (UPIAS) defined disability as: 'the disadvantage or restriction of activity caused by a contemporary social organization which takes little or no account of people who have physical impairments and thus excludes them from participation in the mainstream of social activities'.

Further work on disability theory promoted the idea of the social model of disability and extended the concept beyond physical impairment to include all disabled people, i.e. those who wanted to identify themselves as disabled. The social model demands the right for disabled people to advocate for themselves, and disability is seen as the social consequences of having an impairment (i.e. not intrinsic to the individual). In this model, biology is ignored, and disability and the experience of disability are seen as a product of an unresponsive and inflexible environment. So disability is not produced by the impairment but by barriers in society that do not acknowledge disabled people's needs (BRAINHE 2012). These barriers can be cultural, economic, and environmental (Box 3.3).

A revised model of ICIDH called the International Classification of Functioning, Disability and Health (ICF) was developed by WHO (1999). This new model moved away from being a 'consequences of disease' model to a 'components of health' model (Locker 2008). In the newer model the three main elements are: body structures and functions (and any impairment therein); activities (which are activities undertaken by a person and any limitations or difficulties they might have in undertaking these activities); and

Box 3.3 Barriers

Environment: the environment disables impaired people by not being sufficiently accessible to allow them move about, function, and communicate in the way non-disabled people can.

Economic: society does not provide the same opportunities to people with impairments.

Cultural: society permits the negative attitudes and views held by non-disabled people towards people with physical and psychological impairment. Disabled people are not seen as normal.

(Modified from Best Resources for Achievement and Intervention re Neurodiversity in Higher Education (BRAINHE) (2012). Available at <http://www.brainhe.com/TheSocialModelofDisabilityText.html>, accessed 18 Sept 2012.)

participation in life situations or any difficulties experienced in participation. The approach attempts to bring together the social and medical model of disability, by emphasizing the role the environment plays in disabling people and also the necessity to include and empower disabled people. For many disabled people the model still does not go far enough.

Lay and health care professional concepts of health

Health care professionals' views of health have been dominated by the biomedical model of health. The general public's concept of health (also known as lay concepts of health) has also been influenced by biomedicine, but researchers have also written about the differences in lay concepts of health. The work of Herzlich (1973), Blaxter and Patterson (1982), and Pill and Scott (1982) demonstrated that while the general

public talk about 'absence of disease' as part of the overall concept, people also talk about functional notions of health, coping, being resilient, and keeping cheerful. Blaxter (1990) summarized these perspectives as follows:

Health can be defined negatively, as the absence of illness, functionally as the ability to cope with everyday activities, or positively, as fitness and well-being.

Within this perspective are the ideas of will-power and self-control; people feel it is their duty to be healthy and being ill is seen as failure (Scambler 2008).

There are clearly differences between lay and professional concepts of health. The way in which health professionals assess and measure disease does not always make sense to lay people. On the other hand, health professionals do not always understand the cultural and social interpretations of health and illness made by lay people. In many instances, lay concepts of health co-exist within scientific medicine, but attempts to produce a unifying concept have failed because of overgeneralizations and vagueness (Naidoo and Wills 2009).

Definitions of need

An interest in defining need developed because of the requirement to ration health care as a result of spiralling costs in the early 1970s. Two philosophical interpretations of need evolved: the need for health and the need for health care (Acheson 1978). Within health services a focus on *need for health care* predominated, with the proviso that 'effective and acceptable treatments or care' actually existed (Matthew 1971, p. 20). Culyer (1976, 1995) refined Matthew's focus on effectiveness to include the concept of the ability of the population to benefit from treatment. In this view, not all needs would or could be addressed.

Different definitions of need have been proposed. In Chapter 1, Bradshaw's (1972) taxonomy of need was described. This definition is based on who defines the need. Bradshaw (1994) did not intend to create a hierarchy of needs and there are some inherent weaknesses with the taxonomy. It assumes that there

is a consistency in expression of needs by any one individual when these definitions are used, it fails to consider the influence a person's knowledge and beliefs may have on perception of need, and it conceptualizes expression of need as simply related to supply of services rather than related to psychological, socio-economic, and cultural factors (Bowling and Rees Jones 2001). Despite its limitations, Bradshaw's taxonomy has been widely used in health care, including dentistry. Carr and Wolfe (1979) describe another aspect of need which they term unmet need. This is the difference between the health judged to be needed and the health care actually provided. Cooper (1975) has suggested a taxonomy of need that is broadly similar to Bradshaw (Box 3.4).

All health care needs cannot be met. This necessitates choices about whose and what needs to meet, and difficult decisions about whose needs will remain unmet. At a time of scarce resources, need assessment in medical and dental care has begun to adopt a realistic approach where the individual (1) must have the capacity to benefit from (2) effective interventions that (3) alter the course of disease in a favourable way (Acheson 1978; Sheiham and Spencer 1997).

Professional and lay perspectives of need

Most needs assessments are based on normative, or professionally defined, need. The normative need clinical indicators in current use do not take account of the individual's perception of need. So normative needs that are not of concern to the patient may be met, while

Box 3.4 Cooper's taxonomy of need

Wants A person's own estimation of want for health.

Demand The wants an individual demands a professional to meet.

Need A state judged as in need by a health professional.

(Modified from Cooper 1975.)

Box 3.5 Limitations of normative needs assessments

- Measures of normative need are said to be objective, yet some measures include subjective elements, e.g. IOTN.
- Normative need assessments may be unrealistic and can take little account of resources available.
- There is considerable variation clinically in estimation of normative needs that relate to inter- and intra-examiner variability.
- Normative need assessed in surveys is a poor predictor of treatment undertaken subsequently in clinical practice.
- The focus on treatment in normative need assessments denies the possibility of alternative approaches such as health education and health promotion.
- Normative need assessments do not consider health behaviour.
- Normative need neglects the psychosocial aspects of perception of health and disease.

(Modified from Sheiham and Spencer 1997.)

DISCUSSION POINTS 5

A complaint has been received about you by your local Health Authority as follows: went to the dentist because my teeth were crooked and I wanted them straightened, but what happened was the dentist filled a back tooth which had a hole that I didn't know about (which never troubled me) and then she told me I was too old for orthodontics.

(AW, aged 24)

Can you give an explanation for what has gone wrong between you and your patient?

How might it have been avoided?

his/her wants may remain unmet. See Box 3.5 for a summary of the limitations of normative need.

In order to address the shortcomings of normative need, it has been argued that more comprehensive measures should be used to supplement normative need for dental health care planning (Slade 1997). These include a clinical dimension based on the current knowledge of the life history of the disease,

measures of impairment and social role functioning, the perceived need of the individual, the propensity of the individual to take preventive action, the barriers to preventive action, evidence-based treatment options, and workforce issues (Sheiham and Tsakos 2007).

The gap between a lay person's (the patient's) perception of need and a professional's (the dentist's) perspective has been described as the 'clinical iceberg' (Figure 3.2). This is another important concept in relation to need. Many people may have undiagnosed serious disease or undiagnosed early disease which could be easily treated. It could be supposed that symptoms that people experience which have not resulted in a visit to a health professional are mild, but this is not the case. Doctors are often not consulted for problems that have a successful treatment. How and why people use services is related not only to the illness but also to its symptoms, perception of seriousness, and how the sufferer and others (e.g. friends and immediate family) respond to the symptoms. It is not possible to discuss all aspects in relation to perception of illness and service use here; however, Scambler's (2008, pp 46–50) useful overview has been modified and is presented in Box 3.6.

Definitions of oral health

Having considered the definition of general health, and the difficulties involved in so doing, how might we define oral health? A definition of oral health is challenging and has become complicated by the fact that the terminologies of oral health, oral health status, and oral health-related quality of life are frequently used interchangeably (Locker and Allen 2007). Based on the WHO (1946) definition outlined in the previous section, we could define oral health as a completely healthy dentition (with 32 sound straight teeth and no periodontal or other soft tissue lesions) which results in 'a state of physical, mental and social well being'. But this is obviously impractical, unrealistic, and unachievable. A more appropriate definition might be 'a comfortable and functional dentition that allows individuals to continue their social role' (Dolan 1993). The Department of Health in England (1994) used a similar approach, defining oral health as:

Box 3.6 Perception of illness and service use**Cultural variation**

There is a marked cultural variation in the response to symptoms and how symptoms are interpreted. Some cultures will want to withdraw when in pain, other cultures will want to make a loud noise and involve everyone.

Presentation of disease and knowledge of disease

Diseases that present dramatically often prompt a demand for care, for example toothache. However, the severity of the symptom does not imply serious disease. Many cancers have a slow insidious onset. People's decision to access care is related to their understanding of disease and their ability to distinguish between serious and not serious disease. Symptoms that appear normal and are attributed to everyday causes are less likely to result in someone seeking care.

Triggers

People may have symptoms for a while before they choose to obtain care. Zola (1972) has described five key triggers: interpersonal crisis (e.g. a bereavement); interference with social or personal relationships; sanctioning (pressure from others to seek care); interference with physical or vocational functioning; and temporalizing. This latter term means setting a time-related deadline e.g. if the pain is not gone by the end of the weekend, I shall go to the doctor.

Perceptions of costs and benefits

Are the benefits worth the cost of seeking care? Costs could relate to explicit costs, such as patient charges for

dental treatment, and hidden costs, such as transport, time off work, and child-care charges.

Lay referrals and intervention

Potential patients have a lay referral system. Symptoms are discussed with family, friends, and colleagues before a professional is accessed. Certain cultures who use an extended lay referral system may have low consultation rates. In other cases, lay people may take it upon themselves to initiate an intervention if the symptoms are perceived to be serious (e.g. someone fitting in the street) or if the person is judged temporarily incapable (e.g. a parent for a child).

Geography and availability of services

It is acknowledged that health care is distributed in inverse proportion to need, termed the 'inverse care law' (Tudor Hart 1971). There are more doctors in middle-class areas than in socially deprived areas where the burden of illness is greater. If people perceive that services are not available, they do not demand care. Thus services continue to be poorly available (O'Mullane 1977). People who are homeless, for example, often lack the resources, support, and skills to demand dental care.

Self-care, self-help, and alternative therapies

Adults tend to use self-medication as an alternative to going to the doctor.

(Modified from Scambler 2008, pp. 46–50.)

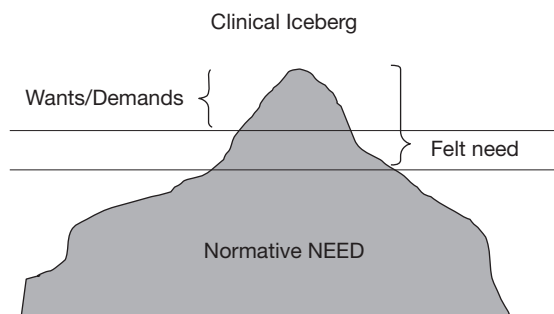


Figure 3.2 The clinical iceberg.

the standard of health of the oral and related issues which enables an individual to eat, speak and socialise without active disease, discomfort or embarrassment and which contributes to general well-being.

Locker (1988) developed a conceptual framework for measuring oral health, calling for the traditional approach to measuring health status to move beyond the measurement of disease and to encompass the

behavioural and social consequences of dental and oral conditions (e.g. eating restrictions and work loss as a result of dental conditions). Traditional clinical measures measure disease but do not provide any information on the function of the oral cavity or perception of symptoms of pain and discomfort. Locker's model was based on ICIDH (WHO 1980). The model and a brief explanation is reproduced in Figure 3.3. The model has provided the theoretical underpinning for the development of measures now called oral health-related quality of life measures (OHRQoL). By focusing on optimal functioning and social role, Locker's model and the measures subsequently developed addressed many of the limitations of normative dental need assessments. See Table 3.2 for some examples of OHRQoL measures. These measures are usually used to inform: need for dental care; outcomes of clinical interventions; and epidemiological surveys of the impact of oral disease on quality of life (Tsakos *et al.* 2012b). Typically they assess domains that are postulated under Locker's conceptual model to contribute to OHRQoL. For example, the OHIP-49 and OHIP-14 explore seven dimensions: functional limitation, physical pain, psychological discomfort, physical disability, social disability, perception of handicap, and psychological disability (Slade 1997; Slade and Spencer 1994).

OHRQoL is difficult to define and there is no agreed consensus. Locker (2000, 2002) defined it as 'the extent to which oral disorders affect functioning and psychosocial being. . . and the symptoms which

emanate from oral diseases and disorders' (Locker 2000, 2002). Sischo and Broder (2011, p. 1274) define OHRQoL as a multi-dimensional construct that includes a subjective evaluation of the individual's oral health, functional well-being, emotional wellbeing, expectations and satisfaction with care, and sense of self and 'is an integral part of general health and well-being'. What is clear is that health, disease, and quality of life are conceptually different. People with chronic conditions report that their quality of life is good, indicating that health and quality of life are also empirically discrete (Locker and Allen 2007). While there are now a multitude of measures available, it is not always clear that the concept of OHRQoL is being measured. For example, some clinical measures that have assessed an aspect of function that has become compromised by oral disease do not necessarily assess the impact on OHRQoL (Locker and Allen 2007). Indeed, many existing measures focus on functional and psychosocial functioning and so measure subjective oral health rather than OHRQoL (Locker and Quinonez 2011). Tsakos *et al.* (2012b) suggest that a more suitable term should be patient/participant-based outcome measures (PBOs).

One of the key challenges is to work out how best to integrate clinical measures with quality of life. Wilson and Cleary (1995) proposed a model to integrate the relationship between measures of clinical status and quality of life, describing characteristics of the person and the environment that mediate how health would

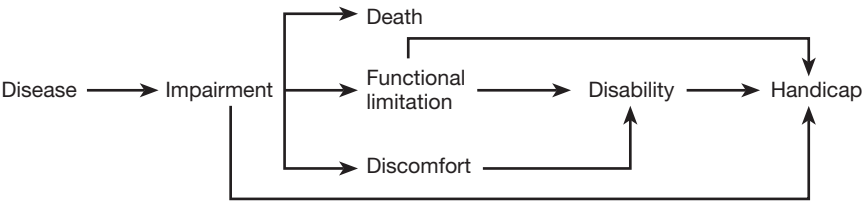


Figure 3.3 Conceptual model of oral health.
Reproduced with permission from Locker, D. (1988). Measuring oral health: a conceptual framework. *Community Dental Health*, 5, 3–18.
Impairment Anatomical loss, structural abnormality, or disturbance in chemical processes.
Functional limitation Restriction in the functions customarily expected of the body.
Discomfort Self-reported pain and discomfort, physical and psychological symptoms, and other not-directly-observable feeling states.
Disability Limitations in, or lack of ability to perform, the activities of daily living.
Handicap The disadvantage and deprivation experienced by people with impairments; functional limitations, pain and discomfort, or disabilities because they cannot or do not conform to the expectations of the group to which they belong.

Table 3.2 Measures of oral health-related quality of life

Full title	Short title	Authors
Social Impacts of Dental Disease	SIDS	Cushing <i>et al.</i> 1986
Dental Impact Profile	DIP	Strauss 1988
General (Geriatric) Oral Health Assessment Index	GOHAI	Atchison and Dolan 1990
Oral Health Impact Profile	OHIP	Slade and Spencer 1994
Dental Impact on Daily Living	DIDLS	Leao and Sheiham 1994
Oral Impacts on Daily Performances	OIDP	Adulyanon and Sheiham 1997
Oral Health-Related Quality of Life Measure	OHRQoL	Kressin 1997
Oral Health Quality of Life Inventory		Cornell <i>et al.</i> 1997
Rand Dental Questions		Dolan 1997
OHRQOL for Dental Hygiene		Gadbury-Amyot 1999
Orthognathic QOL Questionnaire		Cunningham <i>et al.</i> 2000
OHQoL-UK		McGrath and Bedi 2001
Child Oral Health Quality of Life Questionnaire	COHQoL	Jokovic <i>et al.</i> 2002
Family impact of child oral and oro-facial conditions		Locker <i>et al.</i> 2002
Child OIDP		Gherunpong <i>et al.</i> 2004
Surgical Orthodontic Outcome Questionnaire	SOOQ	Locker 2007
Child Oral Health Impact Profile	COHIP	Broder <i>et al.</i> 2007
The Early Childhood Oral Health Impact Scale	ECOHSI	Pahel <i>et al.</i> 2007
Self-reported scale of oral health outcomes for 5-year-old children	SOHO-5	Tsakos <i>et al.</i> 2011

progress to disease and the consequent impact on the quality of life. Wilson and Cleary suggest that quality of life is produced and mediated by both individual factors and general socio-economic and psychological factors. At the individual level (a person's individual characteristics), this is about response to symptoms, changes in functional status, and the person's values and preferences in relation to general health perceptions. At the general level, this is about the psychological, social, and economic supports in the environment which will influence response to symptoms, functional status, and general health perceptions. The Wilson and Cleary model is powerful because it is a conceptual

model on how health-related quality of life may be produced. It helps researchers understand the relationships between the biomedical, social, and behavioural science concepts; it enables providers to learn about conditions that have the greatest impact on quality of life; and it allows clinicians the opportunity to evaluate the importance of different approaches to care and to translate the clinical importance of health-related quality of life (Sousa and Kwok 2006, p. 726).

The definition of oral health may seem to be an irrelevant matter to the individual practitioner, but it is worth considering what the effect might be if the definition of health were wrong. A definition sets the goal

to which demands and treatments are aimed. If the definition is wrong then strategies to improve health or to provide health care will not achieve the most appropriate aims. The direction is likely to be inappropriate. This may lead to an over-ambitious service and a waste of resources.

Health care consumes huge resources. How do we know whether people are healthier as a result of this spending on health care? Deciding whether health has improved is complex and requires a definition and appropriate measure of health in order that goals may be set and achieved. But it is also important that 'what health care decision makers achieve should be what is valued most highly by those who benefit and those who must pay' (Sheill 1995). There is an imperative, therefore, to close the gap between the definition of need as perceived by the provider and that perceived by the consumer of health care (Cushing *et al.* 1986) and to have measures of oral health, subjective oral health status, and OHRQoL that measure dimensions other than the presence of disease.

DISCUSSION POINTS 6

At what point does a malocclusion become a health problem?

Conclusion

This chapter has discussed the definition of health in general and of oral health in particular. Although it appears to be relatively straightforward, it can be seen that the definition of health is more complex than was first thought. It is determined by a complex interplay of many factors: experiences, cultural identity, and socio-economic status. As a result it is important not to make assumptions about any individual's or group's views and it is necessary to avoid stereotyping. An erroneous definition of health can lead to inappropriate use of resources.

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4 Public health approaches to prevention

CHAPTER CONTENTS

Introduction

Principles of strategy design

Risk

Strategy approaches

Principles of screening

Prevention for individuals

Prevention for populations

Other classifications of prevention

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Describe differing strategy approaches in prevention.
- Outline the stages necessary in planning any strategy.
- Describe the rationale for choosing between approaches.
- Outline the principles of screening.
- Design a strategy to tackle a major oral health problem.

This chapter links with:

- Definitions of health (Chapter 2).
- Overview of epidemiology (Chapter 5).
- Trends in oral health (Chapter 6).
- All chapters in Part 3 (Chapters 8–16).

Introduction

Oral diseases are largely preventable but are still highly prevalent. What is going wrong? Why have oral diseases not been eradicated? The answer to these questions is not straightforward. As highlighted in Chapter 2, a complex array of factors influence the health status of individuals and populations. Many of these factors are outside the control of health professionals and the health service. If oral diseases are to be prevented, it is necessary to have a strategy or a plan to tackle the determinants. This chapter discusses the principles of strategy design with reference to prevention. First, it considers the basic principles that need to be addressed when preparing any strategy. Second, it examines the various approaches that can be taken when considering prevention and discusses the advantages and disadvantages of each. It looks at issues concerning

selection of population groups and individuals through screening, and considerations involved in designing a strategy to tackle a major oral health problem.

Principles of strategy design

The existence of a strategy implies that there is an organized plan to reach a goal. In this sense, designing preventive strategies is similar to other health care planning. The same essential elements must be present (Box 4.1).

It is important to have a clear vision of what you are trying to achieve and how it is planned to get there, otherwise it is unlikely that the goal will ever be realized. The first stage is to identify the aim of the project. What is to be achieved? The second stage is to identify the objectives of the project. What are the various steps that will eventually mean that the aim is reached?

To formulate the aims and objectives of a programme it is necessary to collect data to provide information. Asking a series of questions can facilitate this. These data will include the following.

Identifying the problem

What is the problem that is to be addressed? Is it, for example, caries in pre-school children or early identification of oral cancer?

Understanding the problem

What is the natural history of the disease? What are its aetiology, risk factors, and predisposing factors? What is

Box 4.1 Principles of strategy design

Aim: What is to be achieved?

Objectives: What are the steps that eventually mean this aim is reached?

Data collection:

- Identify the problem.
- Understand the problem.
- Possible solutions.
- Evaluation and feedback into strategy design.

its epidemiology? Is the incidence increasing, decreasing, or stable? How important is the disease within the population? It may be important in two ways: it may affect many people within the population or it may affect few people but be of major impact.

Understanding the possible solutions

What effective interventions are there? What is the scientific basis for believing that the intervention is effective? Will the intervention reduce inequalities? What are the means of delivering these interventions? How do these interventions link with other conditions? Will they increase or reduce other conditions? What resources are required? Who else is interested/disinterested in the problem under consideration? Who might help/hinder the implementation of the strategy?

DISCUSSION POINTS 1

In planning a preventive strategy it is necessary to identify the resources that would be required to implement that strategy. What is meant by the term resources? What does it include and what should it include?

Understanding the evaluation phase

Evaluation should include not only whether the aim was achieved but also whether the objectives were met. The factors that helped and hindered the implementation should be recorded. Evaluation is not something that is done at the end of a project but should be built into it. Evaluation should ask questions such as: Does it work? Is it acceptable to participants? Is it reaching the people that it is meant to reach? How are the resources being used? Is the resource utilization appropriate? What is the public health perspective on the proposed strategy? Evaluation should be fed back into the design phase of the strategy so that the strategy is constantly updated and monitored and the lessons of implementation are incorporated into any new design.

The planning cycle is a useful review of the necessary stages in developing a strategy (Figure 4.1). It should

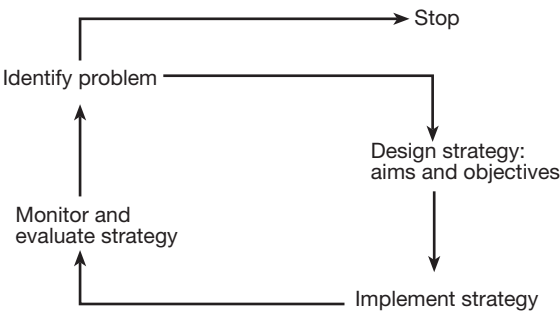


Figure 4.1 The planning cycle.

be a continuous process, so that when the first evaluation is completed the problem is reassessed, and the question ‘Is it time to stop?’ is constantly asked.

Risk

Attempting to prevent a disease is only worthwhile if there is a risk of that condition occurring. Immunization programmes for smallpox were practised until

the 1970s, when the disease was eradicated from the world. The risk of now contracting that disease is almost zero and there is no need to continue the immunization programme. This example is at one end of the spectrum, but most conditions and risk factors are far more difficult to make judgements about. Preventive strategies are about reducing risk by altering the determinants of disease (Burt 2005). How those determinants affect the rate at which disease occurs in the population has an effect on the approach that is adopted towards preventing that disease. The rate is not necessarily constant (Rose 2008).

Rose (2008) presented four possible relationships between exposure to a cause and the associated risk of disease (Figure 4.2), each of which will need different approaches to prevention. Example (b) shows the relationship between cigarette smoking and lung cancer. In this situation any reduction in exposure is likely to be accompanied by a reduction in disease. Choosing an approach that reaches the whole population is

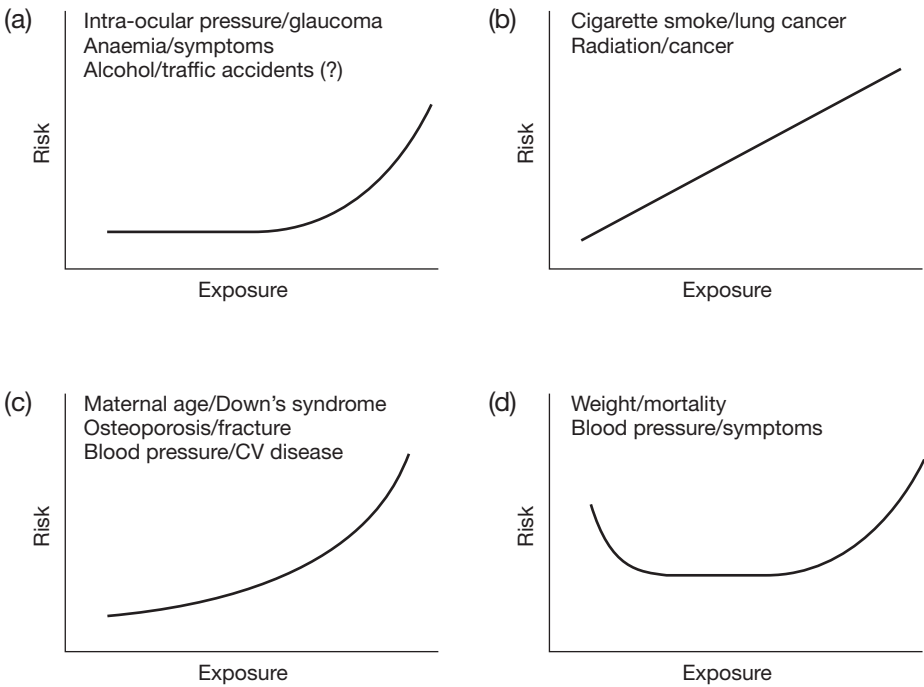


Figure 4.2 Schematic models of four possible relationships between exposure to a cause and the associated risk of disease. Reproduced from Rose (1992) *The strategy of preventative medicine* with permission from Oxford University Press.

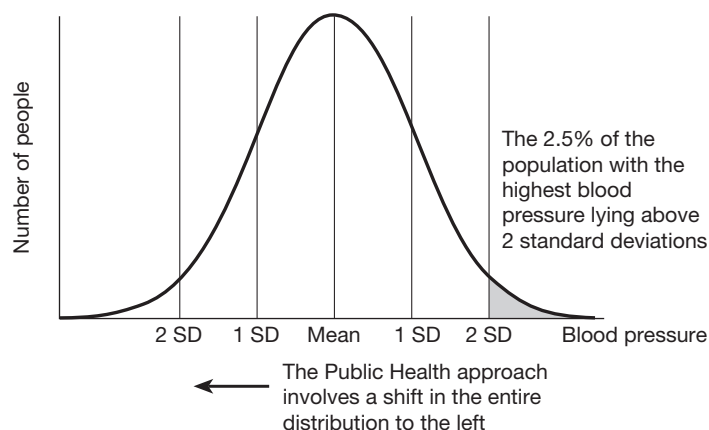


Figure 4.3 A hypothetical normal distribution of a disease within a population.

Reproduced from Ashton and Seymour (1998) *The New Public Health* with permission from Open University Press.

appropriate. Example (c) shows a scenario where significant risk is likely to occur mainly at greater levels of exposure, and an approach that reaches only those at high risk may be preferable. Example (a) is a case where there is no increase in risk until a particular level is reached, while example (d) shows increasing risk at both ends of the spectrum, illustrating a case where it may be desirable to move people towards a middle point.

The concept of risk and how much risk is acceptable is of major importance in deciding which approach to take. There is rarely no risk, so in altering determinants to health it is only possible to reduce the risk.

Strategy approaches

Rose (2008) divides strategy approaches into two distinct groups: those aimed at the whole population and those in which certain sections of the population are identified, either as a group or as individuals. The first approach is known as the whole-population approach, and the second as the risk approach. The risk approach has two subdivisions. Where population subgroups are identified, it is known as the directed or targeted approach, and where individuals are identified, it is known as the high-risk approach.

The whole-population approach

If a disease is normally distributed in the population, then everyone has some disease risk. Assuming that the decision is made to try to reduce the overall disease burden, the choice is between trying to reduce everybody's exposure to the agents that are responsible for the disease and selecting a subgroup of the population at the right-hand end of the distribution, those at highest risk. Rose is strongly in favour of the whole-population approach in this case. He considers that risk factors affect all who live in society and it is therefore more effective to work with the whole population (Figure 4.3). Rose posed the fundamental question: does a small increase in risk in a large number of individuals generate more cases than a large increase in risk in a few individuals?

Another justification of the whole-population approach is when the results of not intervening to prevent a condition in even one person are very severe. The outcome in that person may be devastating or the costs to society of not treating that condition may be very great.

One often-quoted problem (Box 4.2) is that sometimes, although it is known that the whole population would benefit, there just may not be enough money or personnel to provide the intervention. This is more usually a problem with clinically based interventions than with environmental change programmes. It then means that hard decisions have to be made. Batchelor

Box 4.2 Strengths and limitations of the whole-population approach**Strengths**

Radical A whole-population approach that seeks to remove the underlying impediments by addressing the social and political factors confronts the root causes and is radical.

Powerful A small shift in the population distribution of the risk factors may have a large effect on the number of people affected.

Appropriate Changing the normal behaviour of the population to accepted behaviour for good health.

Limitations

Acceptability Although a particular change may be obvious, it may not be acceptable to the

population and they may not be willing to make personal changes or support environmental changes.

Feasibility Other pressures within society may make the changes very hard to bring about.

Costs and safety The costs have to be paid immediately but the benefits are more long term. Reducing access to risk factors may adversely affect some people. Rose gives the example of the social disruption to long-term residents when bad housing is demolished.

Adapted from Burt 2005; Rose 2008.

and Sheiham (2006) have argued that more dental caries will be prevented by concentrating on a whole-population approach, as more caries will occur in those with low levels of disease.

Examples of a whole-population approach

Water fluoridation is an excellent example. Dental caries is a disease that affects most people and the strategy is to alter the environment by adjusting the level of fluoride in the water supply. The advantages are that everyone on the centralized water supply receives the intervention, so that compliance is not a problem. Other examples include seatbelt legislation, where all car passengers are required to wear seatbelts, and smoke-free environments.

The risk approach***The targeted-population approach***

This works on the principle that some groups of the population are at greater risk compared with the whole population. A variety of interventions can be used: it may be a clinical intervention, more of an environmental approach, or the developing of community and

individual skills. It is important to note that this approach means that not all people who are at risk of the disease will be included within the target group. It may be a useful approach particularly where resources are limited or where one group is clearly more disadvantaged than another. With the emphasis on reducing inequities in health, this approach is more in favour and is termed proportionate universalism (Marmot 2010). It differs from the high-risk approach in that not every person within the targeted group is at higher risk but as a whole the group is. With the high-risk approach every person targeted is at increased risk.

Examples of a targeted-population approach

Identifying a section of the population as being at greater risk of dental caries may lead to the decision to provide a targeted-population approach. An example of this might be a small geographical area that has been found to have much higher levels of dental decay. The schools are identified and a decision is made to introduce a fluoride varnish scheme.

In Cardiff, a targeted-population approach was used to try to improve the health of people living in an area called Riverside. All the housing in this area was being

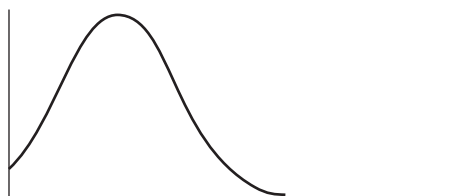
refurbished, and it was hoped that by upgrading the environment of this targeted population, its overall health would also improve.

The high-risk approach

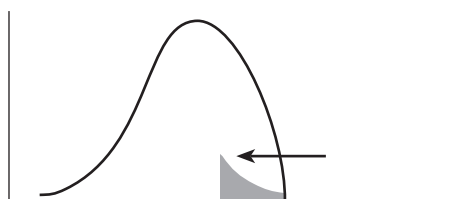
The high-risk approach is used when the treatment of only those at greatest risk is considered most appropriate. Rather than using the whole population or part of it, only specific individuals are identified by a screening programme. As Figure 4.4 illustrates, it involves cutting off the tail of the curve. Before deciding that a high-risk approach is what is required, consider the



Hypothetical normal distribution of disease in the population



Hypothetical distribution of disease after successful application of the whole-population approach



Hypothetical distribution of disease after successful application of the high-risk approach

Figure 4.4 A comparison of the effects of the whole-population and high-risk approaches.

advantages and disadvantages (Box 4.3). It is only of benefit if it can identify those in the population who are at most risk of developing a condition and if there is an effective way of preventing that condition (Burt 2005). It will inevitably miss some people who will contract the condition of interest. By definition, 'high risk' omits those who are at 'low risk', but 'low risk' does not mean 'no risk' (Batchelor and Sheiham 2006; Tickle and Milson 2008). This may or may not be acceptable to either decision-makers or the public. If a screening test is used then the specificity and sensitivity must be of an acceptable level; these terms are defined in **Principles of screening**, but to summarize: high values of these ensure that people with a high risk will be identified and those without will not.

Examples of a high-risk approach

Dental students are required to demonstrate their hepatitis status before entering the dental course. There are two reasons for this: first, to ensure the public's safety by not letting infected people undertake invasive

Box 4.3 Strengths and weaknesses of the high-risk approach

Strengths

- Intervention is appropriate to the individual.
- It avoids interference with those who are not at special risk.
- It is readily accommodated within the ethos and organization of medical care.
- It offers a cost-effective use of resources.
- Selectivity improves the benefit-to-risk ratio.

Weaknesses

- Prevention becomes medicalized.
- Success is only palliative and temporary.
- The strategy is behaviourally inadequate.
- It is limited by a poor ability to predict the future of individuals.
- There are problems of feasibility and cost.
- The contribution to overall control of a disease may be disappointingly small.

Modified from Burt 2005; Rose 2008.

procedures, and second, to enable an effective immunization to be administered as part of the strategy to stop the dental students contracting a potentially fatal illness. In the UK this high-risk approach is satisfactory, only immunizing those who are most at risk (by virtue of their occupation). In other countries where the disease is endemic a whole-population approach is more likely to be appropriate.

Another condition where a high-risk approach is taken is in suggesting to all women who have lost a close relative to breast cancer before the age of 50 that they have regular mammograms. Mammograms have not been shown to be effective in the whole population in this age group, but it is of use in those with a higher risk of contracting the disease. They are limited to women over the age of 50 where effectiveness has been shown.

Finally, in people who have received irradiation of their salivary glands it is highly appropriate to provide a very intensive programme of clinical prevention because of their known greatly increased risk of developing dental caries.

DISCUSSION POINTS 2

Which approach would you take to dealing with pre-school caries in a population with high caries? Would this be any different if there was a high prevalence of the disease in the population compared with a low prevalence?

Principles of screening

Screening has been defined as:

The presumptive identification of unrecognized disease or defect by the application of tests, examinations or other procedures which can be applied rapidly.

(Commission on Chronic Illness 1957)

In the context of prevention the aims of screening are:

- to protect society from contagious disease;
- to identify people who are at high risk of a disease, either for preventive or early treatment interventions.

Holland and Stewart (1990) described four types of screening. These are:

- screening for individuals with risk factors that predispose to disease but are not themselves alerting symptoms;
- screening for individuals with early signs of disease;
- screening for individuals for which preventive action could be taken to restore health;
- screening for established disease that could be alleviated by continuous care and surveillance.

Compared with clinical diagnosis, screening is cheap and rapid, but less accurate.

When people are screened, one of four results may arise. They are:

- **True positive** The test was positive and the individual did have the disease.
- **False positive** The test was positive and the individual did not have the disease.
- **False negative** The test was negative and the individual did have the disease.
- **True negative** The test was negative and the individual did not have the disease.

Four statistics are used to describe the results of a screening test. They are:

- **Sensitivity** The probability of a positive result if the disease is present.
- **Specificity** The probability of a negative result if the disease is absent.
- **Positive predictive value** The probability that the disease is present if the test is positive.
- **Negative predictive value** The probability that the disease is absent if the test is negative.

The first two of these measures relate purely to the validity and reliability of the screening test, while the last two also include a measure of the disease prevalence. In broad terms, a high positive predictive value is dependent upon a high prevalence in the population. The closer the sensitivity and specificity are to one, the closer is the screening test to achieving

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100% accuracy (Figure 4.5). This is very rarely achieved and, as a result, some positive cases may be missed and some negative cases may be referred for further investigation.

DISCUSSION POINTS 3

What are the problems of over-diagnosis and under-diagnosis? Discuss this question considering both aspects.

In assessing the value of a screening test, its acceptability and cost also need to be considered. Further, it is essential that there is some benefit to having the screening test. There is little point in identifying a person as having a condition if there is nothing that can be done to improve their situation.

There are problems arising from screening programmes. The first is that if the screening programme is ineffective it may result in inappropriate use of resources. It may lead to over-diagnosis which may result in the treatment of trivial conditions. Screening may lead to misdiagnosis. If a false negative result is given it may elicit false reassurance, and even encourage a person to ignore other symptoms that they should act upon. Finally, the amount of fear and anxiety that screening tests cause should not be underestimated.

Wilson and Jounger (1968) described ten principles of screening:

- 1 The condition should be an important health problem.
- 2 There should be an accepted treatment for patients with recognized disease.
- 3 Facilities for diagnosis and treatment should be available.
- 4 There should be a recognizable latent or early symptomatic stage.
- 5 There should be a suitable test or examination.
- 6 The test should be acceptable to the population.
- 7 The natural history of the disease, including its development from latent to declared disease, should be adequately understood.
- 8 There should be an agreed policy on whom to treat as patients.
- 9 The cost of case-finding (including diagnosis and treatment of patients diagnosed) should be economically balanced in relation to possible expenditure on medical care as a whole.
- 10 Case finding should be a continuous process and not a 'once and for all' project.

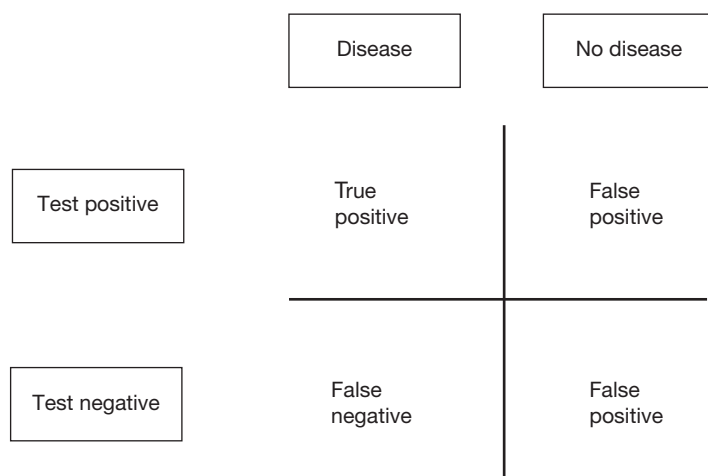


Figure 4.5 Sensitivity and specificity.

DISCUSSION POINTS 4

Based on these criteria, discuss the feasibility of a screening programme for dental caries in children.

Screening programmes, particularly in schools, were routinely conducted in the UK and many other countries for many decades. However, when these programmes were critically appraised based upon the above criteria, it was very evident that they did not achieve the desired results (Tickle *et al.* 2008). As a consequence, school-based screening programmes are now not routinely conducted in the UK.

Prevention for individuals

In dentistry there are several clinically effective preventive techniques available, for example fissure sealants and professionally applied fluorides. Where do these techniques fit into a preventive strategy? It is important to understand that individual prevention is really another form of treatment. As such it has many of the problems associated with traditional operative care. The preventive techniques may be aimed at a specific subgroup of the population, but if those people have problems accessing dental care or they experience other barriers to dentistry, then it is unlikely that they will be able to receive these preventive techniques. Individually based prevention requires compliance. Unless alternative methods of delivery are used it is highly probable that the desired level of uptake will not be achieved. The inverse care law can be as applicable to preventive care as to treatment. Offering preventive care without a strategy may even increase health inequalities because it can often be those who least need the prevention who take it up. All the limitations of the medical model approach also apply to prevention for an individual. A good example of this is caries prevention. Despite the hype and extensive commercial investment in caries diagnostic predictors, the best predictor of future caries remains past disease experience (Burt 2005; Hausen 2008).

Over the years, attempts have been made to use fluoride programmes in schools with varying amounts

of success. Above all else, the use of individual methods of prevention does not use the common risk-factor approach and does little to alter the determinants of disease, which are, after all, the factors that caused the problems. It also is important that any individual method is subject to evaluation and monitoring. It may be that the problem fluoride was introduced to solve no longer exists or is being prevented in an alternative way. A good example of this was a school fluoride mouth-rinsing programme in the USA. Over time, the prevalence of dental caries in the population dropped, the cost-benefit of using a mouth-rinse became much smaller, and the total benefit to the population was greatly reduced. It was thus decided that the most sensible course of action would be to cease the programme. However, this proved much more difficult than had been anticipated (Disney *et al.* 1990).

Before selecting a preventive technique it is important to examine it in the same way as one would a treatment option. A series of questions need to be asked. Is the technique effective? Is it accessible to the desired target population? Is it acceptable to those people? Is it affordable to whoever is responsible for paying? Preventive techniques should also be clinically effective.

DISCUSSION POINTS 5

Imagine a young single mother with two pre-school children living on social security benefits and based some 3 miles from the nearest health centre. It is recommended to her that she should attend the local dentist on several occasions to have her elder child's first permanent molars sealed. Discuss the benefits and limitations of recommending this care to this family.

Prevention for populations

Population prevention can adopt many different approaches and options. However, excluding those activities that are really individual methods, for example immunization, the preventive techniques that are most useful are those that focus on the determinants of health. By following the principles of the Ottawa

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Charter (see Chapter 8), it is possible to bring about change in the environment to create better conditions for good health that does not require action by individuals to ensure compliance and success.

In Chapters 1 and 8 the common risk-factor approach to disease is outlined. By working across several diseases using the common risk-factor approach, it is likely that this will have more success than other approaches that are limited to one disease. It also makes better use of the limited resources that are available and thus better economic sense.

Tobacco control is an excellent example: the use of multiple public health strategies has led to a fall in the rates of smoking in many countries around the world. Clearly, the most relevant factor is the ensuing drop in the rates of lung cancer, but this reduction in smoking may also be implicated in the lower levels of periodontal disease that are now recorded. What are these multiple public health approaches? The World Health Organization has coordinated global action on tobacco through the Framework Convention on Tobacco Control (FCTC) (WHO 2003). This global public health strategy adopted a radical approach which aimed to tackle both the supply and demand for tobacco through a range of complementary actions including:

- regulation of
 - smoking in work and public places
 - contents, packaging, and labelling of tobacco products
 - prohibition of sales to and by young people
 - illicit trade in tobacco products
- reduction in consumer demand by
 - price and tax measures
 - comprehensive ban on tobacco advertising, promotion, and sponsorship
 - education, training, raising public awareness, and assistance with quitting smoking.

More than 170 countries have now adopted the FCTC, which has helped to create a social environment in many parts of the world where tobacco use is no longer seen as a socially acceptable or desirable behaviour. The legislative and policy framework has created smoke-free

living and working conditions for many millions of people—a remarkable public health success story.

It is important to realize that these results are not instant. It may take many years to bring about dramatic changes in the smoking rates of the population. However, there is evidence that rates of smoking and rates of smoking-related cancers are declining in many developed countries.

The evaluation of population-based prevention is particularly difficult to undertake, especially measuring its success by examining changing patterns of disease. However, other types of evaluation are easier. The success of the process can be examined, investigating how many people participated in a screening programme or what has happened to cigarette sales following a health education campaign.

DISCUSSION POINTS 6

The use of alcohol in the UK is similarly subject to considerable environmental and legislative control. Using the Ottawa Charter (Chapter 8) for the major domains, identify factors that are in place to try to reduce alcohol-related problems.

Other classifications of prevention

A very commonly described classification of prevention defines preventive levels as primary, secondary, or tertiary. Although this is often seen, it is now considered out of date and has been superseded by the methods described above. It is described here for completeness and also to explain why it has been replaced. This is most easily done by example, using dental caries.

Primary prevention Dietary control or use of fluoride toothpaste to prevent the start of the carious process.

Secondary prevention Use of fluoride to arrest an early carious lesion or fissure sealant to arrest an occlusal lesion.

Tertiary prevention Restoration of the tooth to restore form and function and to arrest the carious lesion.

As the example shows, the classification concentrates more on the disease process and the individual rather than the aetiological or risk factors and the population. It is also, as Ewles and Simnett (2003) point out, difficult to distinguish when one type of prevention stops and the next stage starts.

DISCUSSION POINTS 7

Refer again to the example of the single mother given in Discussion Points 5. How might population-based measures and the common risk-factor approach be used in this case?

Conclusion

A preventive strategy needs to be based upon a good needs assessment of the problem, an evaluation of the interventions available, and careful consideration of the most appropriate method for delivering the desired intervention. This must include an assessment of which population, part of the population, or individuals need to be included. Prevention delivered to individuals is liable to encounter all the problems of treatment services, and alternative delivery methods may be needed to avoid these. A whole-population strategy is best if it adopts multiple approaches using legislative, environmental, and individual interventions. It is possible that a preventive strategy will increase inequalities if this specific aspect is not addressed.

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5 Overview of epidemiology

CHAPTER CONTENTS

Introduction

How epidemiology is different

Types of study

Causation and association

Measuring health

Why indices are used

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Define epidemiology and its requirements.
- Describe the uses of epidemiology.
- Outline the steps necessary to undertake an epidemiological study.
- Understand the different types of epidemiological study and how they apply to dental care.
- Understand the principles of measuring dental disease.
- Be able to describe the ideal features of an index and know some of the limitations of existing indices.

This chapter links with:

- Trends in oral health (Chapter 6).
- Prevention and oral health promotion (Part 3).
- Public health approaches to prevention (Chapter 4).
- Evidence-based practice (Chapter 7).

Introduction

How tall is the human race? What is meant by being short? Walking down the street, one will see people of various heights and a degree of variation exists. Some people are shorter than others, but when is someone abnormally so? How is it possible to make this judgement?

By recording the height of everyone it is possible to start to produce a picture of people as a whole. Such terms as minimum, maximum, and mean give an indication of the distribution of heights. The science used to collect and examine data in this way is known as epidemiology. Epidemiology is defined as:

The orderly study of diseases and conditions where the group and not the individual is the unit of interest.

(Mausner and Kramer 1985)

Mausner and Kramer (1985) state that epidemiology is concerned with the frequencies of illnesses and injuries in groups of people as well as the factors that influence their distribution. By investigating differences between subgroups of the population and their exposure to certain factors it is possible to identify causal factors and consequently to develop programmes to alleviate the problems. The critical issue is that knowledge is gained by studying patterns in groups as opposed to concentrating solely on the individual.

This chapter gives an overview of the uses of epidemiology in dentistry and describes the main principles of this subject.

Epidemiology in dentistry operates in three broad fields. These are:

- 1 the measurement of dental disease among groups within the population in order to understand factors that influence the distribution;
- 2 identification of factors that cause conditions;
- 3 evaluation of effectiveness of new materials and treatment in clinical trials and assessment of needs and requirements for dental services within the community.

Undertaking epidemiological investigations requires a series of standards and procedures; measures must be made to an agreed common standard, in a methodological manner, and, when necessary, using an appropriate random sample. Taking again the example of height, using a basketball team or a kindergarten class as a sample would give misleading data as to the inferred heights of the population in general; these

examples give an indication of some of the issues that must be considered in epidemiology. This chapter will describe some of these issues, with particular relevance to dentistry.

How epidemiology is different

Epidemiology is the scientific method of studying diseases in populations. It is different from both clinical examination and screening. The differences are outlined in Table 5.1.

DISCUSSION POINTS 1

Why is it important to know if different sections of the community have different disease patterns?

Epidemiological studies: the protocol

All epidemiological investigations require a protocol that follows scientific method. The aim of writing a protocol is to describe in great detail the thinking behind the proposed study and the exact methodology. This chapter describes the process of designing a study and is complemented by Chapter 7 which looks at the process of appraising a paper. Some examples of protocols have been published (NHS Dental Epidemiological 2011; Pine *et al.* 1997; WHO 1997) and are useful as a basis for writing further studies. The purposes of a protocol are given in Box 5.1.

Table 5.1 Comparison of clinical diagnosis and epidemiology and screening

Epidemiologist	Screening	Clinical practice
Applied to populations or samples of selected groups	Offered to selected groups or individuals	Offered to individuals who present at a practice
Criteria relate to the purpose of the study	The identification criteria are related to the need for follow-up	Diagnosis aims to form the basis for treatment
Findings inform subsequent action	Follow-up is offered to those identified as needing it	Treatment is provided

Box 5.1 Purposes of a protocol

- To ensure the study is well thought through and adequately planned.
- To allow the study to be evaluated for scientific and ethical factors prior to starting.
- To ensure that the investigators complete the study as planned.
- To allow others to complete the study for the original investigator, if necessary.
- To enable others to repeat the study.

Background

What previous work has been done in the general area? What has been learned? What mistakes have been made? What was done well? What was done badly? By answering these questions it should be possible to formulate questions that can become aims and objectives.

Aims and objectives

The aims of a study are the questions that are being answered, while the objectives are the steps it is necessary to go through to answer the questions. The aims are extremely important. They should be clear and, most importantly, should not attempt to answer too much.

In descriptive studies, aims and objectives are often sufficient. However, in analytical studies it is usually necessary to also formulate a hypothesis. For example, in a clinical trial that has the aim of comparing the caries-preventive effectiveness of two toothpastes:

- the *objectives* would be to measure and compare the caries increment in two groups of children aged, say, 12 years, over a given time period, say 36 months;
- the *hypothesis* would be that there is a difference in caries preventive effectiveness between the two toothpastes;
- the *null hypothesis* would be that there is no difference in caries preventive effectiveness between the two toothpastes. The null hypothesis is used because it is impossible to prove something; one can only disprove an accepted hypothesis.

Statistical tests are used to identify the chance of the observed results occurring.

Study design and sampling

The first important point is to choose an appropriate study type, and this is discussed in the section **Types of study** and also in Chapter 7. The second important point is to decide upon the population that would be appropriate for the study and to consider whether and how a sample should be drawn.

Sometimes it may be appropriate to include the whole population within the study, but more usually a subgroup is selected. The key principle of sampling is that it must be representative of the population from which it is drawn. This is achieved by randomly sampling all the people in the eligible group in such a way that every individual has an equal chance of being selected. Analyses based upon a random sample can then be used to describe the population, with appropriate statistical limitations being placed upon the interpretation. A random sample should be used wherever possible.

Imagine the situation where it is necessary to achieve a random sample of 5-year-old children from schools. A simple way is to sample in stages: first to sample schools, and then children within the schools. This is called 'stratification'. It may be necessary to weight schools to ensure that all children still have an equal chance of being selected (Pine *et al.* 1997).

Other forms of research use samples such as the 'quota' sample. In essence, this means identifying people who meet predetermined criteria and asking them to participate. This method is used in market research and also in some qualitative research. The problem with this type of sampling is that there may be some characteristics in common between the people who are prepared to take part in the research that influence the results. It is important to acknowledge that this may be so when the data are being analysed.

The sample size for any study is critical. A statistician should be consulted to ensure that sufficient subjects are included for any proposed study where comparisons are to be made. If too few people are selected then it is possible that a real difference that

exists may not be identified. Overall costs may increase for no real benefit if too many subjects are used.

Data collection

The aims, choice of study design, and the selected population or sample will provide information on both the type of data and the frequency with which they need to be collected. In the example in the section **Aims and objectives**, where two toothpastes are to be compared in a clinical trial, it can be seen that data have to be gathered on at least two occasions (baseline and end of study) on two groups (one for each toothpaste).

It is necessary to decide what is to be measured. In the example of the toothpaste, a clinical examination will be required to evaluate the caries status. However, it might be considered that extra information would be gained by taking bitewing radiographs, or that the acceptability of the toothpaste to the clients needed to be measured by a questionnaire or interview.

A principal aim of data collection is to ensure that valid, reliable, and unbiased data are collected. Valid means that the data measure something that truly exists accurately. Reliable means that if measurements are taken on a different occasion the same answer is obtained. Unbiased means that neither the subject nor the examiner influences the finding (Figure 5.1).

Is it possible to construct the study so that it is blind or double blind? Blind means that the subject is not aware whether he or she is in the test or the control group and double blind means that neither the subject nor the assessor is aware. With trials such as toothpaste it is relatively easy to hide which group an

individual is in, but if a trial is comparing an amalgam restoration with a composite restoration this is not possible. The reason for trying to achieve double-blind studies is that knowing what group a subject is in can affect the results. Subjects should also be randomly allocated to groups.

Training and calibration of the examiners and recorders in the measures and criteria to be used is necessary. It is important to keep *inter-examiner* variability (variation between different examiners) and *intra-examiner* variability (variation within the same examiner) to a minimum. This is achieved through training and calibration and monitored by re-examining a percentage of subjects or administering questionnaires on a second occasion to measure the reproducibility.

Prior to starting the main study, a pilot study should be undertaken to check all stages of the proposed study using the predetermined criteria. Any modifications can then be made. It is often only when a pilot study is completed that problems with the design can be identified, saving much time and effort in the main phase of the study.

A standard system for recording data needs to be agreed and training given, as errors are surprisingly common.

Finally, consideration must be given to the handling and storage of data to ensure confidentiality.

Analyse data

It is very important to plan the data analysis *before* the start of the study. As with estimating the sample size, a statistician should be consulted to assist in the planning. This serves two purposes: the investigator needs

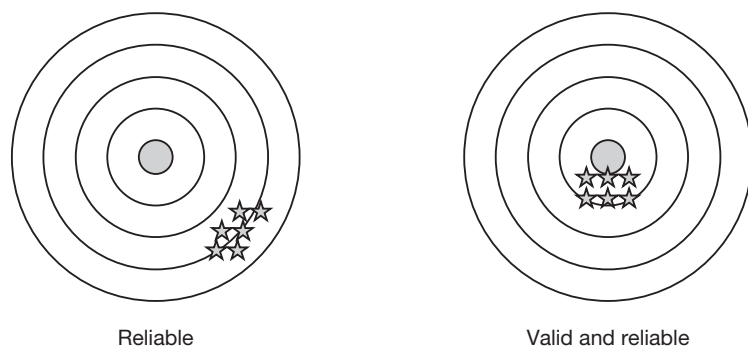


Figure 5.1 The difference between reliability and validity.

to explain the types of data being collected and the reasons for doing so; and the statistician can advise on the correct analyses and any limitations. If a pilot study has been completed, the data from that should be analysed to see if problems exist.

Draw conclusions

The conclusions of the study are the only part that cannot be described in detail in the protocol because they are not known. They should relate back to the aims and objectives and not to other matters. For example, in the example of the toothpaste study it would be unacceptable to conclude that, as there was no difference between the toothpastes, a programme of fissure sealants should be implemented. The study had never set out to evaluate the effectiveness of fissure sealants.

Dissemination

The final stage of a study is dissemination. Even if only negative results were found it is important that these are communicated to the scientific community. Dissemination is more than academic publication. Consideration needs to be given both to appropriate audiences and to appropriate methods of communication. In the example of the toothpaste trial, industry, professionals, and consumers would all benefit from knowing the results.

Ethical and other approvals

Before a proposed study starts it is important to ensure that it has been reviewed and approved by appropriate bodies. The exact process varies between institutions and countries and the detail should be obtained locally. In general, a study needs:

- to be reviewed scientifically to ensure that it is robust;
- to be reviewed ethically to ensure that it is morally acceptable;
- to comply with any relevant legislation or regulations, e.g. clinical trial or data protection legislation.

Ethical review committees are composed of medical researchers and lay people. Lay representation is very

Box 5.2 Factors examined by an ethics committee

- Satisfactory scientific design.
- That the information given to the subject is adequate and comprehensible.
- That the proposed subjects are competent to give consent.
- That the consent is voluntary.
- That the risks and benefits of participating in study are fully explained.
- That issues of confidentiality and data protection are adequately handled.

important in ensuring the project's acceptability to the potential subjects. Box 5.2 lists the factors examined by an ethics committee.

DISCUSSION POINTS 2

Why is it important to have ethical approval? What might be the problems to the subjects and to the investigators of not having it?

Governance

Within the study design it is important that detail is given of the ways in which appropriate research governance will be provided within the study. Details of governance will include the process for gaining informed consent for the subjects of the study, details of how adverse incidents will be reported, how data will be stored, and how it may be used. For clinical trials this will include details of appropriate training for the trial personnel and the establishment of a data monitoring committee and a trial steering committee at least.

Types of study

Descriptive epidemiology

Descriptive epidemiology, as its name suggests, describes patterns of disease, risk factors, and

determinants of health in a population or subgroup. The data are described in such terms as:

- Who is affected: which age groups, which sex, which ethnic or occupational groups?
- Where does the condition occur: in which countries or population subgroups, and when?

There are two types of descriptive data.

Routinely collected data

Much data are gathered in this way. For example, there is a legal requirement to record all deaths in the UK and the reason for the death is given on the death certificate. The Acheson Inquiry used these data and reported on the social class differences between people (Acheson 1998). More specifically, for oral health, all cases of oral cancer are registered and it is possible to analyse in whom and where cases are occurring. Changes in the incidence of cancer over time can also be identified and variations proven to help start examining why they exist, for example, Jemal *et al.* (2010) show changes in death rates over time. Treatment and prescribing data are also collected and can be used to describe patterns.

Cross-sectional studies

These are surveys designed to identify the levels of a condition and associated risk factors at the same time. While easy and rapid to undertake, they are not able to establish cause and effect. For example, if unemployed people are more likely to be ill and if the data are gathered at the same time, it is impossible to identify whether being unemployed makes people ill or whether being ill stops people getting jobs.

Despite the limitations, this method of investigation is much used in dentistry. Regular surveys of the oral health of people are undertaken, some of which are described in Chapter 6.

Because descriptive surveys cannot be used to establish cause and effect, alternative study designs need to be adopted, namely analytical studies.

Analytical studies

Observational

In epidemiology, inferences can be made from observing what people do or have done in the past. It may not be possible to alter a risk factor experimentally, for example, a study investigating the effects of smoking. It would be unacceptable to involve people in a study in which they were required to start smoking. The effects of smoking are known to be detrimental and the study would not be allowed on ethical grounds. To examine the effects of smoking, a study could only compare people in the population who already smoke with those who do not. As a result, the study always carries the risk of misinterpretation. Some other factor may explain why people who smoke have poorer health.

Observational studies are either retrospective (go back in time) or prospective (go forward in time). In retrospective studies, also known as case-control studies, people with the condition of interest are identified: for prospective studies, also known as cohort or longitudinal studies, people who have a higher exposure to the risk factor than normal are identified. For each type of study, the identified group is matched with controls and the groups monitored in prospective studies or questioned in retrospective studies to describe what risk factors in the past they may have been exposed to. By comparing the incidence of the condition and the exposure rates, it is possible to test hypotheses as to what may be causing the condition.

The findings from the observational studies can be further investigated in experimental studies. For example, a case-control study of people with lung cancer compared them with similar people without lung cancer (Doll and Hill 1950). It identified that more people with lung cancer had been smokers. A cohort study then followed people who smoked and compared them with people who were non-smokers and with the incidence of lung cancer. It found that smokers were more likely to develop lung cancer (Doll and Hill 1954).

Experimental or interventional

Randomized clinical trials (RCTs)

These are experimental and prospective. They are regarded as the most appropriate mechanism through which causal relationships can be established and are described by some as the ‘gold standard’ of research. They are most useful in the evaluation of new materials and drugs. RCTs are based on the principle that the two groups used are identical in all respects except in the subject of the study. In the simplest design, subjects are randomly allocated to two groups. One group receives the test treatment and the other a placebo. A true placebo (no treatment) is rarely allowed on both ethical grounds and the difficulty in ensuring that the study is blind. In consequence, the control group usually receives what is the current best treatment. Ideally the study should be undertaken blind or double blind. Baseline measures are made and the subjects followed over time. Differences in the results of treatment are compared between the two groups to see if the new treatment is superior to the old.

In dentistry, a common variation on this design exists in which the mouth is split down the middle—*split mouth design*. It is often seen in trials that evaluate dental filling materials; subjects would have to have two similar cavities on the opposite side before entering the trial. The test material can then be compared in the same environment as the control material. A good example of this type of trial is that reported by Welbury *et al.* (1991).

Community trials

These are also experimental and prospective. However, in some instances it is not possible to randomly allocate people to test and control groups, but rather groups of people, for example, schools in a health education programme. It would be very difficult to stop students discussing the types of health education they had received, and therefore the control group does not really exist. It would be impossible to know what type of intervention each student had had. While it is an acceptable design, such studies need to be handled

statistically in a different way to normal using cluster analysis, as there may be common factors within each group that affect the results. An example of this is a smoking cessation trial using peer-led health promotion (Starky *et al.* 2009). This study showed that using trained ‘peers’ within schools resulted in fewer children starting to smoke.

Natural experiments

Very occasionally, an event may occur that gives a possibility of evaluating something that would not otherwise be possible. This is most easily explained using the example of the dropping of the atomic bombs at Hiroshima and Nagasaki. Their use provided an opportunity to study the relationship between the dose of radiation received, based on how far people lived from the explosion epicentre, and its effect on them. The results provided data that are used to estimate the safety levels of radiation for humans.

Systematic reviews

Often the same question is studied in a number of clinical trials or other investigations with conclusions that may differ. A systematic review is the appropriate technique for examining the question in detail. A systematic review is a method for assessing the quality of the literature covering a topic in an unbiased way by following a strict protocol. It seeks to identify all data, published and unpublished, and in any language, using predefined inclusion and exclusion criteria. Once the data have been identified it may be possible to give an overview of the trials using the statistical technique of meta-analysis. The technique pools the results of the studies to gain an estimate of the overall effect from the combined clinical trials. There are a number of important requirements that the summary data from the clinical trials need to comply with, and when considering undertaking such a study, expert statistical advice is essential. While the methodology around systematic reviews started by developing ways of combining the results from clinical trials, they can now include a wider range of study designs. They are a very useful way of identifying what is known about a particular question, but also in identifying what is not known.

DISCUSSION POINTS 3

In the UK specific surveys of oral health are performed to examine the dental health of the population. These use random samples of the population, agreed criteria, and trained and calibrated examiners. What are the advantages of this assessment of oral health? What are the disadvantages?

Causation and association

In the section **Types of study**, the relevance of each study design in helping to identify causality was noted. While two factors may occur together, this does not imply that the presence of one leads to the other. The relationship may simply be associative. For example, suppose it was found that people who travel by aircraft are more likely to develop skin cancer. Is the mode of travel the causative factor or was it purely an association? The more plausible explanation is that people who travel by aircraft are more likely to sunbathe for longer. To reach the beach to sunbathe they travelled by aeroplane. The causal factor is far more likely to be exposure to the sun than aircraft travel.

Mausner and Kramer (1985) describe the commonly used criteria, often referred to as Bradford Hill's criteria (Box 5.3), to judge whether the relationship between two factors is causal or just an association.

Box 5.3 Bradford Hill's criteria

Strength of the association: the ratio is calculated for the disease rates for those with and without the causative factor. The greater the ratio, the more likely it is to be a causal relationship.

Dose—response related: increasing the amount of the causative factor would lead to increasing amounts of disease.

Consistency of the association: that the finding is similar in different places, in different populations, and with different study methods.

Correct with respect to time: exposure to the causative factor must occur before the disease develops and should also allow for any latent period.

Measuring health

To be able to make comparisons between the health of different groups or in the same group at different times, it is necessary to measure a condition. More often than not this is achieved by measuring an illness or disease rather than health itself.

Rates

A rate is a measure of how disease progresses over time. The most commonly used rates are the death or mortality rate in a population, either in general or for a given condition, and the illness or morbidity rate.

Mortality rates

Mortality rates are measured by collecting information from death certificates. A death certificate contains considerable information, including the individual's name and date of birth, along with the primary and, if appropriate, secondary causes of death. The cause of death is, however, only as accurate as the diagnostic ability of the person completing the form.

Directly comparing mortality rates can be very misleading without taking a variety of factors into consideration. For example, suppose one population has a higher death rate from cancer compared with another. The first population may be significantly older and thus would be expected to have a higher cancer death rate.

Specificity of the association: this criterion suggests that every time the causative factor occurs, there will be a case of the disease. The closer to a one-to-one relationship, the greater the specificity. A one-to-one relationship is very rare, occurring in some types of cancers, and this criterion is less important than the preceding ones.

Biological plausibility: there should be biological plausibility for the supposed causative factor.

Reversibility: if the causative factor is removed there should be fewer cases of the disease.

Adapted from Mausner and Kramer 1985.

To establish whether the difference is due to a particular causative agent or simply natural factors, a method of controlling for factors known to be related is required. This is addressed by standardizing factors such as age and presenting standardized mortality rates (SMRs). These enable true comparison of mortality rates.

Morbidity rates

Morbidity rates are much more difficult to calculate accurately for the majority of diseases and conditions. Certain diseases, primarily infections, have to be notified. These include measles, meningitis, and tuberculosis. It is possible to get a fairly good idea of how many cases of these diseases are being identified by doctors, but not possible to know how many remain undiagnosed in the community.

How much of a specific disease is there in a given population? This can be very difficult to ascertain, as on many occasions it is answered only by analysis of routinely collected data. For example, how could one establish how many people in the population have lower back pain? Surrogate data may be collected by establishing absentee rates from work, or by attendance at the doctor, but neither of these methods comes close to identifying all the people in a population who may have lower back pain, let alone the severity of the condition. The other problem is that it cannot be presumed that people will report back pain at a similar point in their history. Some groups of the population may not visit a doctor at all and continue working, while the condition may interfere much more with other people's lives, causing them to seek help at a much earlier point. Using routinely collected data may give a biased assessment of the true picture. Often the only way to collect reliable and complete morbidity data is to undertake a specific survey where the diagnostic criteria are explicit and agreed.

In dentistry, specific surveys are performed to examine the dental health of the population. In the UK there are two major groups of surveys. The first is the decennial surveys of Adult and Child Dental Health, and the second are the British Association for the Study of Community Dentistry (BASCD) coordinated surveys. These use random samples of the population, agreed

criteria, and trained and calibrated examiners. They are cross-sectional surveys and describe the oral health of their study populations at one point in time. They are also useful for examining changes over time in the health of the population; see Chapter 6.

Prevalence and incidence

Prevalence

Prevalence is the percentage of a population that have the disease in question now, divided by the population at risk.

For example, the prevalence of influenza in a population of dental students would be the number of students who have influenza now divided by the total number of dental students. For prostate cancer the population at risk would exclude women.

Incidence

Incidence is the number of new cases of a disease divided by the population at risk in a given time period.

The incidence of influenza in a population of dental students would be the number of new cases of influenza divided by the total population of dental students over a time period, usually of a year.

The word incidence is used differently in trials investigating dental caries. Rather than using the person as the unit for describing a new case, the tooth or even the surface is used. The incidence of dental caries is therefore expressed as the increase in DMFT or DMFS scores (see **Measuring dental caries** for an explanation of DMFT and DMFS) over two points in time. It is better termed the *increment*.

Why indices are used

At its most simple, an index is an instrument that enables the quantity of a disease or a state to be measured. In dental epidemiology, indices are developed in order to measure diseases, for instance dental caries, tooth erosion, and gum disease.

For example, in order to evaluate a new type of fluoride toothpaste, agreement by those making the assessment

on what constitutes decay in a tooth is required. If the examiners are unable to demonstrate that they can diagnose to a similar standard, then any variation between groups may be related to the variation between the examiners rather than to the effects of the new toothpaste. To help address this and other potential problems, an agreed set of criteria and the conditions under which they are applied are necessary.

Such measures are called indices. Standardization takes place at the beginning of a study and may also be made at various points throughout its course to ensure that there is no alteration in the diagnostic criteria being used. It is important that standards remain the same maintained by the same examiner at different times (intra-examiner variability) and between different examiners at the same time (inter-examiner variability). Statistical tests are used to measure the amount of variability.

The development of indices allows comparisons between different studies and between different data sets. However, when there have been no training exercises between the investigators, any comparisons must always be treated with a degree of caution due to the possibility of a change in diagnostic standards. The great advantage of indices is that, despite their limitations, trends may be identified that are useful in helping define what subsequent investigations need to be undertaken.

Properties of an ideal index

The properties of an ideal index are related to the index's purpose. An index is there to measure change within groups and differences between groups. The purpose of the index is to act as a measuring system that reduces the amount of invalid variation. An index that will come closest to achieving this should have a number of properties (see Box 5.4).

Examples of dental indices

Most commonly used dental indices measure disease rather than health. They measure biological changes and examples are listed in Table 5.2. Most of the examples are categorical in nature.

Other indices may simply be a measurement involving length or depth, for example millimetres when assessing pocket depth or loss of attachment.

Measuring dental caries

The DMF/dmf index is commonly used to measure the prevalence and severity of dental caries in a population. The index is used separately for the primary and the permanent dentition. Upper-case letters (DMF) are used for the permanent dentition and lower-case letters (dmf) for the primary dentition. When a count is made of the number of teeth, the total is known as the DMFT score. A variation on the index is to use tooth surfaces as the assessment unit as opposed to the tooth. This variation is known as the DMFS or dmfs index.

The components are then totalled to give a DMF score for an individual. Other measures can be calculated using data collected by the DMF index; for example, the proportion of the disease that has been treated can be calculated. Three measures can be used: the treatment index, the care index, and the restorative index. Box 5.5 illustrates how they may be calculated. These measures are helpful in giving some indication of which sections of a population are getting treatment and what types of treatment they are receiving.

The DMFT index is an historical index; it records not only current disease but also previous disease. Some problems with the index are summarized in Box 5.6. How do we ensure that a missing tooth has been lost due to decay and not for some other reason? How do we decide whether or not a tooth is decayed? While this may vary from study to study, for nationally collected data in the UK the criteria are standardized through training programmes.

Measuring periodontal disease

Accurate measurement of periodontal disease is much more difficult. It requires considerable training. In recent years, the index most commonly adopted has been the Community Periodontal Index (CPI) (Ainamo *et al.* 1982), but this is an assessment of treatment need, not of the amount or the activity of periodontal disease. Within the general dental service, this index has been

Box 5.4 Properties of an ideal index**Simple**

The index should be easy to understand and easy to learn how to use. This is important as, if it is not, invalid measurement variation is likely to arise.

Objective

The index should be objective to use. It should not be susceptible to the examiner's opinion. The categories should be clear-cut so that it is easy to make a decision as to which category a condition should fit into. The index should also relate to the clinical stages of the condition it is measuring.

Valid

The index must measure what it intends to measure. If the index is measuring dental caries it must measure dental caries and not, for example, enamel hypoplasia. The index should also bear a relationship to any 'gold standard' for diagnosing the condition. When a positive finding is found by the index it should also be found by the gold standard and vice versa. In statistical terms it should have good sensitivity and specificity.

Reliable

Each time the index is used it should find the same result. This is different to the next category, 'reproducible', as reliability is concerned with the internal workings of the index not the variation caused by examiners. In other words, there should not be variation on occasions of use as a result of an internal flaw within the index.

Reproducible

The index must give the same result if the condition being assessed has not changed. This must be true if it is

the same examiner measuring at different times or a different examiner measuring the condition at the same or a different time. These issues apply equally if it is the subject who is undertaking the measurements, for example by completing a questionnaire.

Quantifiable

The index should provide a measurement on which statistical analyses can be undertaken, for example it might calculate the mean and distribution of the data collected. Many indices use categorical measurement scales of a condition; for example, a men, women, or oral hygiene index that uses good, fair, and poor. It is important to distinguish whether an index is numerical or categorical, as producing mean figures for, say, data collected on the CPITN index is wrong.

Sensitive

The index should be able to detect small changes. Ideally, an index should be able to measure change in either direction, that is, whether the condition being measured improves or deteriorates, although certain conditions are irreversible; for example, a DMF score.

Acceptable

Any index, when being applied to a subject, should be acceptable. It should not be painful, or embarrass or demean them. The length of time to complete any assessment should also be borne in mind.

Decayed due to caries (D or d).

Missing due to caries (M or m).

Filled due to caries (F or f).

adapted and renamed the Basic Periodontal Examination (BPE), where it is used to identify those patients in need of a more detailed periodontal examination. In this instance, it is used as a screening test. The CPI is useful for describing the prevalence of need for different types of treatment, but it is not suitable for measuring the effectiveness of treatments or the total disease burden within a population. The current thinking that

periodontal disease is a disease that progresses in bursts has altered the way in which it should be measured. For assessing the historical burden of periodontal disease in a group or population, measuring the loss of attachment is the most appropriate. Recording bleeding pockets gives a measure of disease activity. Loss of attachment is measured from the amelo-cemental junction to the base of the pocket (Garcia and Dietrich 2012).

Table 5.2 Commonly used dental indices

Index	Use	Reference
DMFT/dmft	Measurement of caries	Klein <i>et al.</i> 1938
ICDAS	All levels of caries	Ismail <i>et al.</i> 2007
CPITN (BPE) (CPI)	Periodontal treatment need	Ainamo <i>et al.</i> 1982
	Plaque	Loe and Silness 1963
	Gingivitis	Silness and Loe 1964
DDE modified	Enamel defects	Clarkson and O'Mullane 1989
TF index	Fluorosis	Thylstrup and Fejerskov 1978
Dean's index	Fluorosis	Dean 1934
Horowitz index	Fluorosis	Horowitz 1986
IOTN and PAR	Orthodontic treatment need and assessment of treatment need	Shaw <i>et al.</i> 1991
Trauma index	Trauma	O'Brien 1994
BEWE index	Erosion and wear	Bartlett <i>et al.</i> 2008
RCI	Root caries	Katz 1980

BPE: Basic Periodontal Examination
CPITN: Community Periodontal Index of Treatment Need, now known as CPI—Community Periodontal Index
DDE: Developmental Defects of Enamel
DMFT/dmft: Decayed, missing, and filled teeth permanent dentition/decayed, missing, and filled teeth primary dentition
ICDAS: International Caries Detection and Assessment System
IOTN: Index of Orthodontic Treatment Need
PAR: Peer Assessment Rating
RCI: Root Caries Index
TF: Thylstrup and Fejerskov

Box 5.5 Calculating the treatment index, the care index, and the restorative index

The treatment index is $((M + F) / DMF) \times 100$
The care index is $(F / DMF) \times 100$
The restorative index is $(F / (D + F)) \times 100$

DISCUSSION POINTS 4

At what point does a malocclusion become a health problem? Similarly, what treatment should be provided for gingivitis?

Limitations of existing indices

While indices have continued to change and develop, knowledge of the natural history of disease has also changed. For example, the traditional view of periodontal disease as a series of progressions from mild gingivitis to severe periodontal disease has been discounted. The limitations of the DMF index have been discussed previously. Perhaps more fundamentally, the indices continue to measure disease as opposed to health. Various researchers, for example, for DMF data Sheiham *et al.* (1987) and Marcenes and Sheiham (1993), have tried to tackle this problem by analysing

Box 5.6 Problems with the DMF index**Relevance**

The relevance of DMF to caries experience assumes that missing and filled teeth were once carious. Teeth may be missing for other reasons, such as trauma or periodontal disease.

Treatment decisions

A restoration may be placed for preventive reasons (e.g. preventive resin restoration of a tooth with an early lesion) rather than restorative reasons (e.g. amalgam restoration for restoring a carious tooth). The DMF cannot distinguish between the two and the level of caries experience may be inflated.

Quality of teeth

The DMF assigns equal weight to filled, missing, and decayed teeth. An individual with 10 decayed teeth or

10 missing teeth will score the same as one with 10 filled teeth. The implications for their dental health may be different but the index does not make any distinction.

Benefit of treatment

Filled teeth score the same as missing teeth, implying that there is no difference and no benefit to having decayed teeth restored.

Irreversible

The DMF index is irreversible: an individual's total score can only increase over time. Consequently it is of limited value when assessing whether there have been improvements in an individual's health.

Sheiham *et al.* 1987.

Box 5.7 The functional health and tissue health indices

$$\begin{aligned}\text{F-health (FH)} &= \text{Sound Teeth} + \text{Filled Teeth} \\ \text{T-health (TH)} &= (\text{Sound Teeth} \times 4) + (\text{Filled Teeth} \times 2) \\ &\quad + (\text{Decayed Teeth} \times 1)\end{aligned}$$

Marcenes and Sheiham 1993.

the data gathered in different ways. The first proposal (F-health) was termed a functional measure of health and gave equal weight to filled and sound teeth and zero weighting to decayed teeth. The second proposal was the T-health, where proportional weights were given to sound, filled, and decayed teeth. This later modification conceptualizes sound teeth as best, filled teeth as good but not as good as sound, and decayed teeth as having the possibility of restoration as they have not been extracted. These composite measures of dental health status attempt to give a better indication of the function and quality of the dentition (Box 5.7).

Impact of disease on quality of life

Bowling (1991) outlines the problems facing people who are trying to measure health. She points out that, particularly for chronic diseases, measuring disease rates is now no longer sufficient. It is far more important to describe the social and psychological effects of the problem, as well as the more traditional aspects, on the quality of life.

Existing indicators of oral disease fail to measure the impact of disease, impairment, and health care on people's well-being; they are professionally based and do not take account of people's perception of need. The biomedical model of disease predominates.

Locker (1988) argued for a conceptual model of oral health that not only defined health as an absence of disease but also included functional aspects along with social and psychological well-being. The model focuses on optimal functioning and social roles, thus addressing many of the limitations of normative clinical need assessment. It has provided the context for

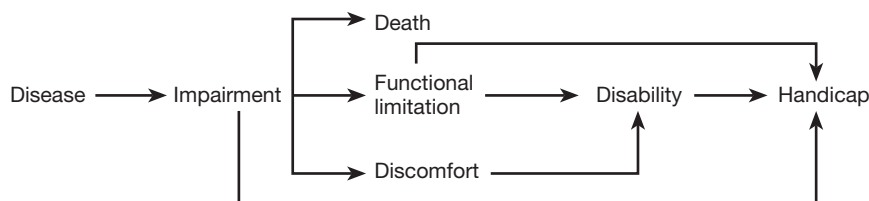


Figure 5.2 The conceptual model of health, adapted from WHO (1980).

Reproduced from Locker, D. (1988). Measuring oral health: a conceptual framework. *Community Dental Health*, **5**, 3–18.

the development of oral health-related quality of life measures (OHQoL), which are described in Chapter 3. Locker's conceptual model is reproduced in Figure 5.2. For a more detailed discussion of the model and its relationship to need see Chapters 3 and 21.

Locker's diagram suggests that, if disease works in this way, the measurement of changes in discomfort or functional limitation, rather than disease, would be more appropriate for assessing the effects of ill health and intervention. The degree of handicap may be a better measure than disease. Think again about the difference between a filled front tooth and a missing front tooth. Both of these score 1 on the DMFT index, but do they both affect a person's life in the same way? Do they both affect everybody's lives in the same way?

While it is difficult to measure how conditions such as these affect individuals, doing so gives some distinct advantages. For example, in the debate about what treatments are provided, priorities can be set for those conditions that affected or impacted on people's lives more. Such measures are far more complex and difficult to develop. Examples are in use for both general health and, more specifically, oral health. A detailed description is outside the scope of this book, but two oral health examples are the Oral Health Impact Profile (OHIP), as defined by Slade and Spencer (1994), and Oral Impacts on Daily Performance (OIDP), which is described by Leao and Sheiham (1996). OHIP is an index that has been used for comparing the effectiveness of treatments, not in terms of clinical outcomes but in terms of improvement to the quality of life of the person. Allen and McMillan (2002) used OHIP to compare the outcome of treatment with conventional dentures with that of implant retained dentures. This measured how it

improved quality of life rather than just whether the dentures look acceptable.

Questionnaires

These are a common way of collecting data. However, they require considerable skill in construction. The principles of data collection apply equally when developing questionnaires. Where possible, it is sensible to use questions or questionnaires that have been developed and tested for a similar study. This allows for comparison between studies. Questionnaires are limited in general to the current state of knowledge on a topic. They also tend to reflect the researchers' view of key issues. Questionnaires have the advantage that data on large numbers of people can be collected, but they may lack depth. In addition, transferring questionnaires into either different cultures or languages is not straightforward; the wording may mean something very different in one situation when compared to another. This is why piloting is so important. Furthermore, people sometimes complete questionnaires in a way that reflects well upon themselves rather than what they really think or do—so-called *socially desirable responding*.

A common error is to 'reinvent the wheel'. For example, a person might want to investigate levels of dental anxiety in his or her patients and start to develop questions such as: 'How anxious are you when coming to the surgery?' However, there is an accepted and validated dental anxiety instrument, the Modified Dental Anxiety Scale, and it would be far preferable to use this instead (Humphris *et al.* 1995). Questionnaire response rates can be improved by how the questionnaire looks, how it is worded, and how often non-respondents are

reminded to complete their forms. The key message, therefore, in undertaking questionnaire-based research is to seek advice, as this is an area requiring considerable expertise, although this is not always recognized.

Qualitative research

Epidemiology has concentrated on quantitative methods. However, not all data can be gathered using quantitative methodologies nor analysed using the more conventional methods. An alternative method that addresses the shortcomings is qualitative methodology. Qualitative methodology aims to explore, interpret, or obtain a deeper understanding of social phenomena (Bower and Scambler 2007). It asks questions such as 'what' and 'why'. Qualitative methodology is particularly useful when we wish to understand people's perspectives and motivations. It can be used in a complementary way with quantitative methodology.

Qualitative techniques obtain data through two main sources: the focus group and the one-to-one interview. These may be structured discussions or interviews where the investigators have a list of topics that they want the subjects to discuss. Alternatively they may be semi-structured where, although there are some predetermined topics, the interviewers want to lead the subjects through the interview in a particular manner while allowing for a wide range of views to be expressed. A third alternative is when the interviews are totally unstructured. The interviewer's role is to facilitate the process and not to contribute to it.

Irrespective of the method adopted, it is very important for the interviewer to be independent so as not to bias the findings. The interviews are often tape-recorded or very detailed notes are made. This second method is less desirable. The interview tapes are transcribed and can be analysed either by hand or by using a software package. The purpose of the analysis is to identify themes that arise in several of the interviews. Once identified, the researcher attempts to create structure to the data by categorizing responses into patterns.

Qualitative data may be used in a variety of different ways. They may be used to develop questionnaires for subsequent quantitative testing. Data can also be used

Box 5.8 Main differences between qualitative and quantitative research

In qualitative research:

- Fewer people are included in samples.
- Samples are unlikely to be random but may be purposive or convenient.
- The matters discussed are determined by the research subjects rather than by the researcher.
- Greater quantities of more detailed data are collected.

for reporting themes or ideas to inform policy and decision-making. Less often they are used after quantitative research to try to add detail or reasons to the results. An article series gives much more detail on the use of qualitative research in dentistry and is detailed in the **Further reading** section of this chapter.

The main differences between qualitative and quantitative research are shown in Box 5.8.

Conclusion

Epidemiology is the study of disease and risk factors in groups. The study methodology, sampling, and measuring tools are important aspects in this science. With the development of evidence-based dentistry there is an increasing need to understand the principles of epidemiology.

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6 Trends in oral health

CHAPTER CONTENTS

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Useful websites

By the end of this chapter you should be able to:

- Describe the trends in oral health of UK children and adults.
- Describe the trends in oral health inequality.
- Discuss the implications of these trends for oral health care in the UK.
- Understand why other countries may have different trends.

This chapter links with:

- Introduction to the principles of dental public health (Chapter 1).
- Definitions of health (Chapter 3).
- Overview of epidemiology (Chapter 5).
- Sugars and caries prevention (Chapter 11).
- Prevention of periodontal disease (Chapter 13).
- Oral cancer prevention (Chapter 14).
- Planning dental services (Chapter 21).

Introduction

In the introduction to Chapter 1 it was stressed that in order to decide whether a disease is a public health problem it is important to be able to answer some key questions about it. Is the disease widespread? Is it on the increase? What individuals or groups appear to be susceptible? Do we know what causes it? Can it be prevented? What is the impact of the disease on the individual and society? The epidemiology of oral diseases can provide some detailed answers to these important questions. This chapter will present a brief overview of trends in oral diseases for children and adults in the UK. It will focus on periodontal disease, oral cancer, and dental caries, but there is also a brief section on dental trauma and erosion. Dentofacial anomalies, per se, are not diseases but will be included here, as their prevalence and incidence have implications for dental care because of the impact on social and psychological well-being. The impact on health will be presented. The problems of oral health inequality will be reviewed and the implications of trends in oral diseases for dental care in the UK will be discussed.

There are many surveys describing the oral health of children and adults in the UK, with decennial national surveys of both groups since 1973. Scotland has not participated in the two most recent surveys, children in 2003 and adults in 2009. In these surveys all dental examiners are trained and calibrated, so that the diagnostic criteria are consistent and national trends can be identified. See Chapter 5 for a brief description of the importance of standardization of diagnostic criteria. In addition, the British Association for the Study of Community Dentistry (BASCD) undertakes surveys of the oral health of children within the districts of the UK; again, examiners are trained and calibrated and changes in trends in oral health across smaller areas can be monitored at shorter intervals than in the 10-yearly national surveys. Details of these surveys, including diagnostic criteria, can be found at <http://www.bascd.org/oral-health-surveys>.

Periodontal disease

Epidemiology

Current concepts in relation to periodontal disease have changed considerably in the last 20–30 years. The traditional ‘progressive’ disease model has been replaced by the ‘burst theory’. That is, periodontal diseases have short ‘bursts’ of activity followed by long periods of remission and healing (Goodson *et al.* 1982; Socransky *et al.* 1984). While gingivitis is widespread, it does not inevitably lead to premature tooth loss. For the majority of the population, periodontal disease progression is slow (Pilot 1997). Only 5% of the population experience destructive periodontal disease and this is declining (Burt 1988). The severity and rate of destructive periodontal disease does not lead to significant tooth loss or pain and discomfort in the majority of populations. See Chapter 13 for a more detailed account.

Young people rarely experience severe destructive periodontal disease. The national Child Dental Health Survey, 2003 (Lader 2005) reported on the periodontal health of children aged 15 years, of whom 43% had

gingivitis compared with 45% in 1993 and 48% in 1983, as indicated by the presence of bleeding on probing. Of those aged 15 years, 81% reported that they brushed their teeth at least twice a day compared with 76% of 12-year-olds and 78% of 8-year-olds and 5-year-olds. For all age groups, girls reported more frequent brushing than boys.

In the 2009 Adult Dental Health Survey, 54% of adults had some gingival bleeding on probing, indicating the presence of active gingival disease, while 45% of adults had some periodontal pocketing and 8% had severe pocketing (greater than 6 mm) (Fuller *et al.* 2011). The amounts of periodontal pocketing increased with age, with only 19% of those aged 16–24 years affected compared with 61% of adults aged 75–84 years. Two-thirds of dentate adults had visible plaque on their teeth and 68% had some calculus, which is a reduction from the previous survey. The frequency of tooth-brushing was associated with presence of visible plaque: those who reported brushing their teeth at least twice per day were less likely to have visible plaque than those who brushed their teeth at least once per day or never (Chadwick *et al.* 2011). These facts are summarized in Box 6.1.

Aetiology

The presence of dental plaque or biofilm together with the host’s immune system are the most important factors in the aetiology of periodontal disease. Many factors have been associated with periodontal disease and are considered to modify the course of the disease. These include smoking, certain systemic diseases, e.g. diabetes, stressful life events, and local factors (poor restoration contour) that contribute to

Box 6.1 Periodontal disease

- Gingivitis common in children and in adults.
- Almost half of adults have some pocketing.
- Only around 5–8% have severe pocketing.
- Periodontal disease increases with age.
- Oral hygiene and smoking are the two most modifiable factors.

plaque accumulation (Genco and Williams 2012). Calculus (tartar) does not itself lead to periodontal disease. It does, however, promote plaque retention. Periodontal disease has been implicated as a risk factor for certain systemic diseases and conditions such as cardiovascular disease, stroke, diabetes, and pre-term birth and low birth weight.

Treatment

Chapple (2009) supports the current view that the cornerstone of periodontal treatment should be disruption of the subgingival biofilm. This is believed to prevent the immune system reacting to the biofilm. There is limited evidence to support the effectiveness of routine scale and polishes and root planing. The best strategy is to focus on prevention through tooth-cleaning and refraining from smoking.

Implications for the future of trends in periodontal disease

Although periodontal disease is common in the adult population, gross destructive periodontal disease is experienced by a small group of people (about 5%) and it would appear to be declining. As will be seen in the section **Dental caries experience in adults**, almost all people are now retaining their own teeth, even into old age. They are also retaining more teeth. This means that while the percentage of people with severe problems may be declining, the absolute number may be increasing. As treatment options are poorly evidence-based, the best option would appear to be in developing public health strategies to promote oral cleanliness and reduce smoking.

DISCUSSION POINTS 1

Are periodontal diseases a public health problem? Use the example of adolescents to illustrate your answer.

Why do you think adolescent boys do not brush their teeth as often as girls?

How would you convince a young male teenager to brush his teeth more frequently?

Oral cancer

Epidemiology

Oral cancer is usually taken to include cancer of the lip, tongue, gingiva, floor of the mouth, and other unspecified parts of the mouth. In the UK in 2009 there were 6,236 new cases, of which 66% were in men, and in 2008 there were 1,822 deaths from oral cancer. Incidence increases with age and 44% of cases are found in those aged 65 and above (Cancer Research Campaign 2012).

Trends

Oral cancer rates have increased in the UK since the 1970s. Age-standardized European rates have increased by 25% for men and 28% for women (Cancer Research Campaign 2012). The reasons for the increase are unclear. As survival rates after treatment are not good, the best option for management of oral cancer is to invest in prevention through reduction in alcohol and tobacco use.

Aetiology

The causes of oral cancer are well documented, and are divided into established risk factors and predisposing factors. The two most important risk factors (accounting for 75–90% of all cases) are tobacco and alcohol use (Cancer Research Campaign 2012). People who both drink *and* smoke have a much greater risk of oral cancer than those who either drink *or* smoke. The changing incidence is thought to be due to altered alcohol use. Oral cancers have increased in those European countries where alcohol consumption has increased and decreased in France where alcohol consumption has decreased. There is also evidence that increased consumption of fruit and particularly vegetables reduces the risk of oral cancer (Cancer Research Campaign 2012). Parkin *et al.* (2011) estimate that 93% of oral and pharyngeal cancers in men and 85% in women are due to environmental and lifestyle factors. The chewing of betel nut (paan) and use

of smokeless tobacco are also risk factors. These habits are most common in those of Bangladeshi origin. Infection with human papilloma virus increases the risk of developing oral cancer, and those who are immunocompromised, e.g. with HIV/AIDS, are at higher risk (Cancer Research Campaign, 2012).

Treatment

While progress has been made in the treatment of oral cancers, survival rates have improved only slightly. Survival is higher with early detection. The 5-year survival rate is 95% for lip cancer, with most patients being cured. The 5-year survival rate for oral cavity is 55% for women and 48% for men (Cancer Research Campaign 2012). Analysis of where the improvement lies in survival rates has shown that it was amongst the most affluent groups.

Implications for the future of trends in oral cancer

It would appear that the incidence and mortality rates for oral cancers may have increased. The best strategy for the future would appear to lie in early detection of oral cancers and health-promotion activities aimed at reducing the consumption of alcohol and tobacco products.

DISCUSSION POINTS 2

Using your knowledge of health promotion, describe how you would plan and implement a health promotion intervention designed to reduce consumption of tobacco products.

Dental caries

Epidemiology

There have been dramatic changes in the pattern and distribution of dental caries in children and adults in the UK since the 1970s (Box 6.2). The epidemiology of

dental caries in the UK will be briefly described for children's primary and permanent dentition and for adults.

In children's primary dentition

The biggest changes in decay experience were seen in 5-year-olds between 1973 and 1983, when the percentage who were caries-free had almost doubled and the DMFT had halved (Murray and Pitts 1997). The fall in decay experience coincides with the widespread use of fluoride toothpaste, which is generally felt to be the major reason for such a dramatic change.

Successive national surveys have shown a reduction in the proportion of children with obvious decay experience in their primary dentition. In 1983, 50% of 5-year-olds had obvious decay experience compared with 45% in 1993 and 43% in 2003. In other words, the proportion of children without decay experience increased (Pitts and Harker 2005). The mean number of teeth with obvious decay was 1.8 in 1983, 1.7 in 1993, and 1.6 in 2003, which is a relatively small reduction. Taking these facts together, it would appear that fewer children are affected with obvious decay, but that those who do have decay must be affected with greater levels of decay.

In children with a permanent dentition

A similar dramatic reduction in caries in the permanent dentition has also been seen since the 1970s and this has continued. In 1983, 38% of 8-year-olds had obvious decay experience and this had fallen to only 19% in 1993 and 14% in 2003. The reductions in 12- and 15-year-olds was even more dramatic. For 15-year-olds it fell from 93% in 1983 to 49% in 2003. The number of decayed teeth and of fillings also reduced (Pitts and Harker 2005).

Box 6.2 Dental caries in children

- Caries dramatically lower than the 1970s.
- Low levels of restoration in primary dentition.
- Continuing reduction in permanent dentition of decay and fillings.
- Social inequities remain in both dentitions.

Dental caries experience in adults

Improvements in decay rates have also been seen in adults. Edentulosity has decreased in all UK adults since 1968, when 37% of the population over 16 had no teeth (Gray *et al.* 1970). In 2009, edentulosity had declined to 6% (Fuller *et al.* 2011) (Figure 6.1).

However, this means that there are still 2.7 million adults across England, Wales, and Northern Ireland without any teeth. A very major change since 1998 is that now over half of people aged 85 years and older have their own teeth. Those who do have their own teeth now have more teeth. The decline in the rate of total tooth loss is also very clear among men and women; the proportion of men who are edentate has fallen from 24 per cent to 4 per cent between 1978 and 2009, while the decline among women has been even greater, falling 25 percentage points from 32 per cent in 1978 to 7 per cent in 2009.

Many older people are retaining part of their natural dentition into later life. For older adults, ‘21 functional teeth’ in an acceptable occlusion, free from unsightly gaps, and without a need for a partial denture is a more realistic goal than 32 teeth. The improvement in adults with ‘21 functional teeth’ was very marked between 1978 (73%) and 1988 (81%) (Murray and Pitts 1997) and 1998 (83%) (Kelly *et al.* 2000), to 86% in 2009 (Fuller *et al.* 2011). Sixty one percent of those aged 65–74 years and 26% of those aged over 85 years had 21 or more teeth. The presence of natural teeth in the oldest people

indicates a major shift in the need for preventive care and restorative care throughout life (Box 6.3).

Root caries

As people retain their teeth for longer into old age, root caries may become a problem. Root caries is preventable and associated with increasing age; however, as yet there are no reliable indicators of risk (Ritter *et al.* 2010). The extent and nature of the problem in the UK is not fully understood as root caries data were only gathered on adults in 1988. In 1998, decay of the root surfaces was uncommon in younger adults (Nunn *et al.* 2001). In those aged over 65, an average of 10.6 teeth were vulnerable and a third had caries. In 2009, 7% of adults were affected with root caries. Only 1% of those aged 16–24 years were affected compared with 11% of those aged 55–64 years and 20% of those aged 75–84 years. More men than women had root caries. There was a social gradient, with 5% of people from managerial and professional households compared with 9% from routine and manual occupation households (White *et al.* 2011).

Aetiology

A good description of the evidence relating dental caries and consumption of fermentable carbohydrates (sugars) is given in Fejerskov and Kidd (2008). The cause of dental caries is the consumption of fermentable carbohydrates (sugars). There is a dose–response

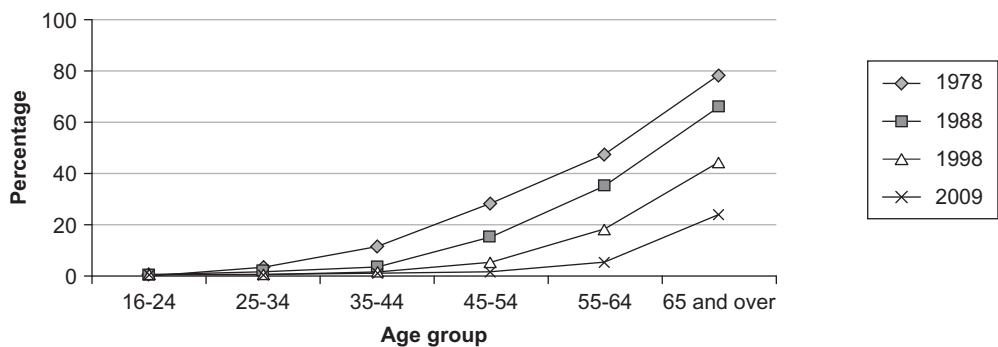


Figure 6.1 Trends in percentage edentate by age, England, 1978–2009. Copyright © 2013, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved.

Box 6.3 Dental caries in adults

- Reducing levels of edentulousness.
- Increasing numbers of teeth in older people.
- Most people will retain functional numbers of teeth.
- Social inequities remain in dental decay and edentulousness.
- Older adults (over 45) have high restorative maintenance needs.
- High treatment needs for another 40 years.

between the quantity of sugar consumed and the development of dental caries. It is suggested that at levels below 10 kg/person per year (15 kg/person per year in fluoridated areas) dental caries will not develop. It is also known that the greater availability of sugar (Sreebny 1982) is associated with increasing dental caries experience in children. Much of these data linking caries and sugar were gathered from retrospective studies. In a prospective survey, Rugg-Gunn *et al.* (1984) demonstrated that there was a statistically significant difference in caries increment over 2 years in children who were high and low consumers of sugars.

Treatment

Much of the budget for dental care in the General Dental Service is devoted to the treatment, management, and consequences of dental caries, a disease that has been described as easily preventable (Watt and Sheiham 1999). While there have been substantial declines in dental caries, these have not been linked to the existence of a comprehensive restorative service. The declines in dental caries are attributable to the use of fluoridated toothpastes since their introduction in the mid-1970s (Watt and Sheiham 1999). There has not been any substantial decline in sugar consumption in the UK.

New understanding in relation to the progression of dental caries indicates that there is a potential for an early carious lesion to arrest (Fejerskov and Kidd 2008). This means that rather than intervene when early caries is detected, clinicians should opt to monitor the lesion (depending on individual patient factors)

and institute preventative measures, such as reduction in sugar consumption and local topical application of fluorides (Banerjee and Watson 2011). Once the tooth is filled, however small, it enters the 'restorative cycle'. The filling may fail, leak, and require replacement (50% of amalgam fillings had failed 2 years after placement in the General Dental Service in Scotland (Elderton and Davies 1984)). The filling will need to be replaced, the cavity will be enlarged, and the potential for failure will increase. Eventually the tooth may need advanced restorative care and ultimately an extraction should that fail. Banerjee and Watson (2011) warn that new understanding of the progression of dental caries demands that the clinical intervention is postponed for as long as possible (Elderton 1996) because lesions have the potential to arrest.

Implications of trends in dental caries

Trends in dental caries indicate that there have been substantial declines in caries experience across all age groups since the 1970s. In addition, there have been declines in the consequences of dental caries, with many teenagers and young people having no fillings and the level of edentulousness reducing in older groups. There is, however, a disturbing increase in oral health inequality, which will be discussed in a the section **Oral health inequality**.

Most experts attribute the declines to the use of fluoridated toothpastes. Sugar consumption patterns (the cause of caries) have not changed substantially. Fluoridation of the water supplies could bring about further declines, as could appropriate use of fissure sealants. There is therefore the potential for further substantial declines.

The pattern and distribution of caries is changing, which has implications for targeting of resources, dental treatment, and choice of restorative material. In addition, older age groups are retaining their teeth for longer and the incidence and prevalence of root caries may increase. As older people retain their teeth, there will be a need for more complex restorative treatment, as they would have entered the 'restorative cycle' in the 1970s and 1980s. Their dentition may require high maintenance.

The best choice for management of dental caries still lies in its prevention rather than its treatment. It has been suggested that treatment services accounted for only 3% of the reduction in dental caries in the 1970s (Nadanovsky 1995). The established best methods for preventing dental caries are: reduction in sugar consumption, optimal exposure to fluorides, and appropriate use of fissure sealants.

International trends

This section has described the caries patterns within the UK and these patterns show similarities to many other countries, but not all. The availability of sugar and fluorides, which are the key aetiological factors, determine the prevalence of caries. The WHO monitoring of oral disease website reports latest surveys from around the world (Country/Area Profile Project (CAPP), <http://www.mah.se/CAPP/>). In general terms, countries with extreme poverty and very limited access to refined carbohydrates have extremely low levels of caries, while countries with a rapidly growing economy are more likely to have rapidly increasing caries rates.

Trauma

The proportion of children experiencing trauma to their anterior teeth increases with age, from 5% of 8-year-olds, 11% of 12-year-olds, and 13% of 15-year-olds. In all age groups, boys have more experience of trauma than girls: at age 15, 16% of boys had traumatic injuries compared with 10% of girls (Chadwick and Pendry 2005).

Erosion and non-carious tooth surface loss

Dental erosion has been defined as the loss of dental hard tissue by a chemical process that does not involve bacteria. The aetiology of dental erosion is multifactorial and includes individual anatomy, saliva composition and flow, intrinsic sources of acid from gastro-oesophageal flux, and consumption of non-milk

extrinsic sugars and demineralizing acidic foods (Al-Dlaigan *et al.* 2001; O' Sullivan and Milosevic 2008). It is difficult to measure in epidemiological surveys as it is hard to separate it from abrasion and wear. The condition is better termed non-carious tooth surface loss and this was measured in the 2003 survey.

In the primary dentition, most children have signs of tooth wear by the time the teeth are shed. In 2003, 53% of 5-year-olds had tooth surface loss on the lingual surface of their incisors and in 22% it was so severe that it had involved the dentine or pulp. In 15-year-olds, 28% had tooth surface loss on the lingual surface of their upper left incisor in the 2003 Child Dental Health Survey compared with 23% in 1993. In most measures there was a slight increase in tooth surface loss between the two surveys. It does not appear to be a public health problem at present, but many clinicians are reporting a clinical impression that it is increasing (Al-Dlaigan *et al.* 2001; O' Sullivan and Milosevic 2008). There is a need for careful monitoring as consumption of demineralizing acidic drinks remains high.

In dentate adults, over 77% showed evidence of wear in their front teeth extending into dentine (White *et al.* 2011). As people age they were more likely to have tooth wear. More people now have tooth wear compared with the previous survey.

Dentofacial anomalies and orthodontic treatment need

'Malocclusion is not a disease but rather a set of dental variations that have little influence on oral health' (Shaw 1997). Dentofacial anomalies can range from gross disfigurement to minor irregularities in the alignment of the teeth. In the past there was a belief that dentofacial anomalies could compromise oral health, but this view is now largely discounted (Shaw 1997). The impacts of dentofacial anomalies are now considered to occur in the social and psychological spheres, in terms of feelings about well-being and appearance. There have been attempts to establish the treatment need in a population and the Index of Orthodontic Treatment Need (IOTN) was developed. It attempts to

link the dentofacial variation to perceived aesthetic impairment so that those suffering the greatest impact will be prioritized for treatment (Brook and Shaw 1989).

Oral health inequality

Inequality has been described as health differences that are avoidable, unnecessary, unjust, and unfair (Whitehead 1991). Despite the marked improvement in oral health in children and adults since the 1970s, there is evidence of widening oral health inequality (Watt and Sheiham 1999). As with many diseases, there are inequalities in the distribution of dental caries in the population. Children and adults from more disadvantaged backgrounds have more decay experience than those from more advantaged backgrounds, and the decay experience is more severe.

In children

In children aged 5–15 years, the pattern of attendance is strongly and independently associated with dental decay experience in the primary dentition (Watt and Sheiham 1999). In the Child Dental Health Survey, 60% of 5-year-olds attending deprived schools had obvious decay experience compared with only 40% of children in non-deprived schools. The children at the deprived schools had more decayed teeth but a similar number of fillings as those in non-deprived schools. Another measure of deprivation was also used and that was based on household occupation. There was a clear gradient, with obvious decay experience in 34% of 5-year-olds from managerial and professional households, 36% from intermediate households, and 53% from routine and manual households (Lader *et al.* 2005).

In the permanent dentition in 15-year-olds, 47% of those from managerial and professional households, 66% from intermediate households, and 65% from routine and manual households had obvious decay experience. In children from routine and manual households, 7% had permanent extractions compared with 2% from managerial and professional households.

Fluoridation of the water supply is thought to reduce inequalities. Children in a disadvantaged fluoridated

area have DMFT levels similar to children living in an advantaged fluoridated area. However, the level of evidence is weak (NHS Centre 2000).

In adults

Inequalities continue into adult life. In the 2009 Adult Dental Health Survey, 10% of adults in routine and manual occupations were edentate compared with 5% in intermediate and 2% in managerial and professional occupations (Fuller *et al.* 2011). Of those with any teeth, those from more deprived backgrounds had fewer teeth and more decayed teeth (White *et al.* 2011).

With respect to periodontal disease, people who come from higher social backgrounds have lower levels of bleeding gums (49% compared with 59%) and less pocketing over 6 mm (8% compared with 13%). Current dental pain was reported by 11% of those from deprived backgrounds compared to 7% of the most advantaged. They were also more likely to have an open pulp, ulceration, or fistula (Steele *et al.* 2011).

Amongst ethnic minorities

Watt and Sheiham (1999) concluded that there were no differences in oral health among ethnic minorities when groups of the same social class were compared. The authors suggested that ethnicity as a variable might not be relevant any longer and might distract attention from more important variables such as social class and incomes.

National, regional, and district inequalities

There are considerable inequalities in oral health status between children and adults living in the poorer north of England and the wealthier south. In the UK there is a threefold difference in the dental health of 5-year-olds resident in the north compared to 5-year-olds resident in the south of England. The regional and district inequalities are related to deprivation (Jones 2001).

Inequalities by gender

There are no differences by gender in the proportion of adult men and women who are dentate. Women have more fillings across all age bands; they have less periodontal disease but are more likely to be edentulous (Watt and Sheiham 1999).

Conclusion

There have been dramatic improvements in oral health across all age groups in the UK. There are, however, marked inequalities between children's oral health, associated with social class and area of residence. These inequalities persist into adulthood but are less pronounced, except in relation to edentulousness (Box 6.4).

New concepts in relation to the epidemiology and management of periodontal disease suggest that there needs to be a rethink in relation to the provision of care. The efficacy of scale and polishing and calculus removal has been questioned. Periodontal disease does not appear to have a significant impact on oral health. There is a strong association between plaque and tobacco use in the aetiology of periodontal disease.

Oral cancers are rare in the UK, but the incidence and prevalence is increasing in men. There is a 50% survival rate at 5 years. Development of oral cancer is linked to smoking and alcohol use.

The incidence of dental caries is continuing to drop, but there are indications that this decline may have slowed in 5-year-olds. Studies demonstrate a reduction in provision of restorative care for children. Adults are retaining more natural teeth into later life. This has implications for the maintenance of their dentition.

Box 6.4 Inequalities in dental caries

Higher levels of dental caries are associated with:

- Attendance at deprived schools.
- Parents from more deprived social background.
- Adults from more deprived social background.
- From Wales, Northern Ireland, and the north of England.
- From non-fluoridated areas.

There is evidence that new concepts in diagnosis and management of dental caries has not penetrated clinical practice. However, the development of adhesive materials (which are technique sensitive) has the potential to stimulate a non-invasive approach to the management of early carious lesions. The declines in dental caries have been attributed to widespread use of fluoridated toothpastes. There is potential for further declines by reducing sugar consumption, appropriate exposure to fluorides, and appropriate use of fissure sealants.

Malocclusion does not contribute to poor oral health; its impacts lie in the social and psychological domains of health. The decision to seek orthodontic care is complex and there is evidence that dentists are often the instigators of a need not previously felt by the patient. A review of the provision of orthodontic care in the General Dental Service demonstrated that 21% of cases were unimproved or worse as a result of orthodontic treatment.

Erosion and tooth surface loss has been linked with the consumption of demineralizing food and drinks. It appears to have low prevalence at present but will need to be monitored over the next few years.

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Useful websites

Childsmile-NHS Health Scotland: <http://www.child-smile.org.uk/>.

Dental Health Services Research Unit at Dundee maintains the BASCD data: <http://www.dundee.ac.uk/dhsru/CDH>.

Department of Health: <https://www.gov.uk/government/organisations/department-of-health>.

Oral Health Country/Area Profile Project-Malmö University: <http://www.mah.se/capp>.

7 Evidence-based practice

CHAPTER CONTENTS

Introduction

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By the end of this chapter you should be able to:

- Define and understand the terms evidence-based medicine (EBM) and evidence-based practice (EBP).
- Describe the reasons for the development of EBM and EBP.
- Describe and apply the five steps of EBP.
- Describe and understand the limitations of EBP.
- Begin using EBP as part of your own continuing professional education and clinical practice.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- Public health approaches to prevention (Chapter 4).
- Overview of epidemiology (Chapter 5).
- Prevention in practice: caries, periodontal disease, and oral cancers (Chapters 11, 13, and 14).

Introduction

In the last 40 years, the needs of and demands for health care both in the UK and worldwide have increased dramatically. These increases are related to the population ageing, the development of new technologies and knowledge, rising patient expectations, and associated increases in professional expectations about the possibilities and potential of health care (Muir Gray 1997). In this period, the key policy concerns of the international health care community have been about containing costs and enabling equitable access to high quality health care, while also ensuring greater accountability, patient satisfaction, and improved public health (Lohr *et al.* 1998). Health care resources are finite and must be shared equitably on the basis of need, capacity to benefit, and effectiveness. The use of high quality research evidence and guidelines to inform individual patient care and

population health care have become central to this process.

In the mid-1970s, various writers began to question the effectiveness of medicine and the increasingly wider influence exerted by the medical profession on society. For example, McKeown (1976) mapped mortality rates for the main killer airborne diseases (tuberculosis, whooping cough, scarlet fever, diphtheria, and smallpox) against contemporary advances in medicine from the mid-19th century to the early 1970s. He found that the declines in the incidence and prevalence of communicable diseases had occurred *before* their microbial cause had been identified and *before* an effective clinical intervention had been developed. McKeown concluded that the declines in mortality rates were not attributable to immunization and therapy and suggested the declines could more reasonably be attributed to better nutrition and improved housing conditions which had occurred over the period. Allied to McKeown's historical analysis was the work of Archie Cochrane who evaluated contemporary clinical practice in the 1970s. In his seminal work *Effectiveness and Efficiency*, Cochrane (1972) showed that many medical treatments provided in the NHS were ineffective, inefficient, and founded on *medical opinion* rather than on a rigorous assessment of efficacy and effectiveness. Box 7.1 defines the terms efficacy, effective, and efficiency. In order to make the best use of finite health care resources, Cochrane called for equitable health care delivery that was underpinned by proven effectiveness. He proposed the randomized controlled trial (RCT) as the best way to assess the effectiveness of

therapeutic interventions. Cochrane envisaged a future where every specialty and subspecialty would have its own bank of regularly updated *critical summaries* of evidence and that would be based on RCTs.

While the RCT has been lauded as the preferred 'gold standard' for assessing efficacy of therapeutic interventions, it is not an appropriate research design for all research questions, particularly complex ones such as the primary prevention of disease or the secondary prevention of adverse progression for an established disease (Feinstein 1983). For example, the WHO European Working Group on Health Promotion Evaluation (WHO 1998) concluded that in most cases the use of RCTs to evaluate health promotion was 'inappropriate and misleading'. The pivotal decision for high quality research is the selection of a research design that is appropriate to the research question. Nevertheless, by the late 1990s the dramatic rise in clinical research and the explosion in biomedical informatics and technology meant that there was greater availability and access to clinical research based on RCTs. What was needed now was a way of evaluating and using this research to inform clinicians, clinical practice, and the public (Wyer and Silva 2009). The introduction of a *problem-based learning* approach to clinical education, first developed in the 1990s at McMaster Medical School in Canada, stimulated new thinking about the best way to evaluate and to use research to inform individual patient care. It was in Canada that the phrase *evidence-based medicine* (EBM) was coined. The evidence-based movement spread rapidly throughout Canada, North America, the UK, and Europe, largely due to the extensive research funding available in

Box 7.1 Definitions of efficacy, effectiveness, and efficiency

Efficacy: the potential of a drug, treatment, or measure to produce an effect. Efficacy studies test whether a drug, treatment, or measure works, and typically the study is a double-blind randomized controlled trial. The participants under study meet strict inclusion and exclusion criteria and the drug, treatment, or measure is applied under optimal conditions.

Effective: the ability of a drug, treatment, or measure to produce an effect in real life and 'ordinary' clinical practice.

Efficiency: the relationship between the value of the inputs (effort expended in terms of money, resources, and time) and the results achieved that may be the quantity of the outputs (technical efficiency) or the value of the outputs (social efficiency). Estimating efficiency allows comparisons with other methods or strategies to produce the same results.

these regions and the location of the pioneers of EBM in Canada and the UK (Alderson 1998; Lohr *et al.* 1998). These developments together created the conditions for the emergence of EBM (Wyer and Silva 2009).

What is evidence-based medicine (EBM)?

An early description of EBM from the early 1990s suggested that EBM was the ‘ability to track down, critically appraise (for its validity and usefulness), and incorporate a rapidly growing body of evidence into clinical practice’ (Sackett and Rosenberg 1995). In this definition the location and appraisal of information was emphasized, while the clinician might be seen to be criticized as being unscientific, as this quote from the earlier EBM working group (EBWG 1992) illustrates: ‘EBM de-emphasises the intuition, unsystematic clinical experience, and patho-physiological rationale as sufficient grounds for clinical decision making’. Not surprisingly this was challenged by clinicians who felt that their clinical expertise and experience built up over many years was being ignored. In later definitions Sackett *et al.* acknowledged the central role of clinical intuition, particularly in areas where evidence was lacking. Subsequent definitions of EBM combined clinical experience and intuition with appraisal of research evidence as the ‘conscientious, explicit and judicious use of current best evidence’ and the integration of this best research evidence from systematic research ‘with clinical expertise and patient values’ (Sackett *et al.* 1996a, 1996b). The tripartite relationship between evidence, clinical application, and patient values (including respect for dignity and choice) is illustrated in Figure 7.1.

EBM became characterized by a task-orientated approach to the use of medical information and electronic databases, the so-called five steps: *Ask* an answerable question, *Access* the literature, *Appraise* the literature, *Apply* the evidence, and *Assess* the impact on practice. In this approach, a conceptual framework was introduced that used a simplified equation linking specific study designs to clinical categories. A simple shorthand was produced whereby RCTs

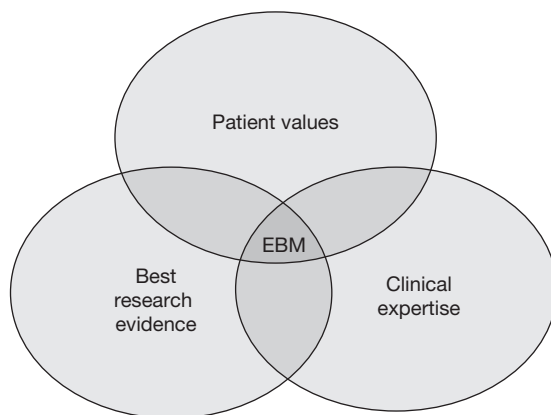


Figure 7.1 Evidence-based medicine.

Adapted from Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS (1996b): Evidence based medicine: what it is and what it isn't. *BMJ* 312:71–2.

were understood as ‘therapy’ and cohort studies as ‘prognosis’, and it continues to be used today (Wyer and Silva 2009). The objective in those early days was simplicity, though some argue now that the approach limits the type of question that may be asked and the way answers in the literature may be interpreted (Wyer and Silva 2009). Others have argued that there is too much emphasis on appraisal and not enough emphasis on clinical judgment and patient values.

What is evidence-based practice (EBP)?

As definitions and the practice of an evidence-based approach spread into the allied professions and social care, it became apparent that the term evidence-based practice (EBP) was better able to reflect the way in which the entire health care teams and organizations had embraced the evidence-based approach. EBP evolved from clinical epidemiology (the application of research undertaken on populations to inform individual clinical decision-making) and critical appraisal to involve ‘explicit decision making within the clinicians’ daily practice’ (Dawes *et al.* 2005, p. 3). EBP was required to be ‘based on the best available, current, valid and relevant evidence’ (Dawes *et al.* 2005, p. 1).

Decisions about care were required to be ‘made by those receiving care, informed by the tacit and explicit knowledge of those providing care within the context of available resources’ (Dawes *et al.* 2005, p. 1). As a minimum standard, the ‘Sicily statement on evidence-based practice’ suggests that practitioners should understand the principles of EBP, implement EBP policy, and adopt a critical attitude to their own practice and to evidence (Dawes *et al.* 2005, p. 5). The term EBP will now be used throughout this text to refer to an evidence-based approach. By applying EBP to the delivery of a population health care approach (and paraphrasing Muir Gray (1997), health services should deliver the ‘right’ treatment to the ‘right’ patient at the ‘right’ time using the ‘right’ person in the most appropriate ‘right’ setting with the ‘right’ patient experience (i.e. patient choice, dignity, satisfaction, and participation in clinical decision-making).

What is evidence-based dentistry?

In the early days of the evidenced-based movement, Richards and Lawrence introduced the concept to dentistry by defining evidence-based dentistry (EBD) as a ‘process that restructures the way in which we think about clinical problems’ and which was characterized by ‘making decisions based on known evidence’ (Richards and Lawrence 1995, pp. 270–1). The new terminology of EBP reflects the fact that the entire health care team and health organizations have adopted a shared evidence-based approach (Dawes 2005). It is now unnecessary to have a term particular to dentistry.

The quality of reporting of trials in dental research is acknowledged to require improvement (Niederman *et al.* 2002; Sjogren and Halling 2002). There has, however, been an increase in the reporting of studies that compare the outcomes of different forms of treatment, for example studies demonstrating the benefits of amalgam versus composite restorative materials, implant retained versus mandibular retained dentures, and topical fluorides and gels for the prevention of dental caries (Abt *et al.* 2012). Despite this increase in high quality

evidence, there remains the problem of getting this new research evidence into clinical dental practice (McClone *et al.* 2001).

The process of evidence-based practice (EBP)—the five steps

EBP is a process with five key steps, as summarized in Box 7.2. Sackett *et al.* (2000) describes the process as asking an answerable question using the participant, intervention, comparator, and outcome (PICO) format (or PICOT if you want to add time); locating the clinical research to answer the question; appraising the research for validity and relevance to the question; applying the research to the clinical situation in hand; and, finally, evaluating performance in application of the first four steps.

Ask a clear answerable question

The key to EBP is the construction of a clear answerable question derived from a clinical issue or problem. Framing these questions takes some skill as clinical questions are often broad and complex. The clinical question will need to be refined and modified to make it answerable. It must be relevant to the patient’s problems.

PICO

An excellent way to aid the refinement of the question is to use the PICO format (Box 7.3). PICO enables the question to be translated into a format that is searchable in

Box 7.2 The process of evidence-based practice (the five steps)

Ask a clear answerable question (PICO format).

Access the literature and locate the best evidence available.

Appraise the literature for validity, clinical relevance, and applicability.

Apply and *act* on the evidence.

Assess steps 1–4, including *audit* of performance.

medical databases and is more likely to give answers that are precise and relevant.

The use of PICO allows the specification of the participants’ characteristics (e.g. age, gender, social class, all of which might be important to the question). The definition of the intervention or indicator is critical as it will determine the type of study searched for, e.g. is the question about therapy, a diagnostic test, or prognosis? The comparator denotes the alternative intervention; this could be another intervention or no intervention. Finally, it is important to describe and to specify the outcome of interest, e.g. lead to lower mortality, decrease in bleeding on probing.

Box 7.3 PICO format for refining clinical questions

Patient or Population

Intervention or Indicator

Comparator or Control

Outcome

Table 7.1 illustrates an example of how a question could be framed using PICO.

Choice of appropriate research design to answer the question

Having elaborated the question, the next phase is to identify the study design that would best address the question. Figure 7.2 illustrates the different types of studies and Questions 1 to 3 (Box 7.4) help the reader identify the features of different types of study.

In Figure 7.2 the first large division is between analytical and non-analytical studies. A non-analytical study simply describes the characteristics or some characteristic of the population at a particular time. Examples include case reports, case series, and cross-sectional studies. Cross-sectional studies such as the decennial Adult Dental Health Surveys in the UK (see Chapters 5 and 6) describe the frequency of factors and the size of oral health problems, e.g. edentulousness, dental caries experience, dental anxiety. Qualitative

Table 7.1 Framing a question using PICO

Stages	1	2	3	4
Directing the question	P atient or p roblem	I ntervention	C omparison/ intervention	O utcomes
Tips for building	Starting with your patient, ask: ‘How would I describe a groups of patients similar to mine?’	Ask yourself: ‘Which main intervention am I considering?’	Ask yourself: ‘What is the main alternative to compare with the intervention?’	Ask yourself: ‘What can I hope to achieve, or what could this exposure really affect?’
	Balance precision with brevity	Be specific	Be specific	Be specific
Example	‘in patients with acute necrotizing gingivitis ...’	‘... would adding metronidazole to standard mechanical debridement for AUG ...?’	‘... when compared with standard mechanical debridement alone ...?’	‘... lead to a faster resolution of the condition? ... Is this worth the inconvenience of taking the medication and any side effects ...?’

Modified from the Centre for Evidence-based Medicine (2009): Asking Focused Questions at: <http://www.cebm.net/index.aspx?o=1036>, accessed 23/08/2012. Reproduced with permission.

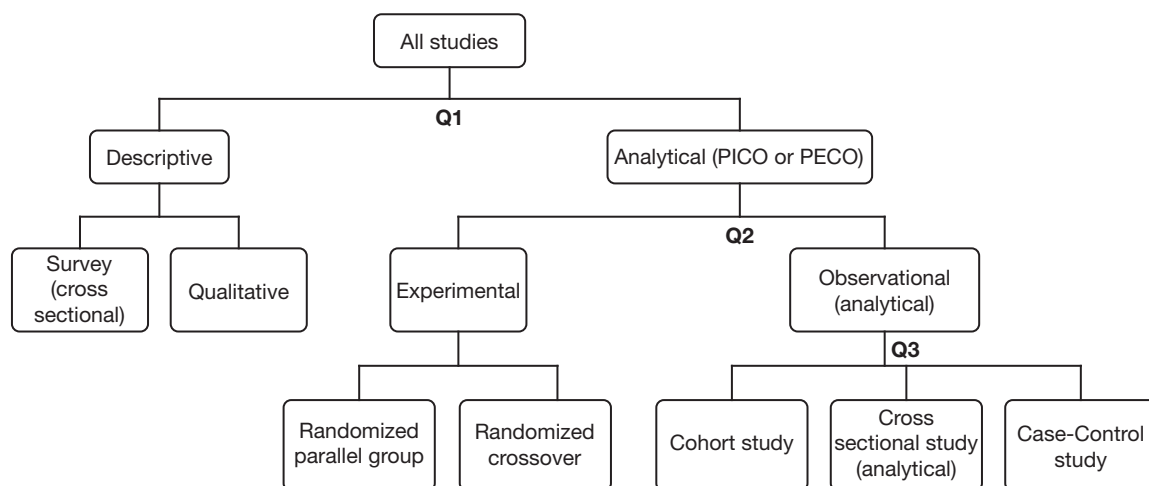


Figure 7.2 Tree of different types of studies.

Modified from the Centre for Evidence Based Medicine (2012): Study Designs: <http://www.cebm.net/index.aspx?o=1039> accessed 23/08/2012. Reproduced with permission.

Box 7.4 Questions to identify the type of study illustrated in Figure 7.2

Q1 What was the aim of the study?

- a) To describe a population (PO questions) → descriptive study
- b) To quantify the relationship between factors (PICO questions) → analytic

Q2 If analytical, was the intervention randomly selected?

- a) Yes → RCT
- b) No → Observational study

Q3 When were the outcomes determined?

- a) Sometime after exposure or intervention → cohort study (prospective)
- b) At the same time as the exposure or intervention → cross-sectional study
- c) Before the exposure was determined → case control (retrospective study based on recall of the exposure)

Source: Centre for Evidence-based Medicine 2012: Study designs at <http://www.cebm.net/index.aspx?o=1039>. Accessed 23/08/2012. Reproduced with permission.

studies are also included here under descriptive studies. Qualitative research is concerned with the understanding of the meaning or nature of experiences, health problems, and behaviours of individuals (Pope and May 2001; Pope *et al.* 2000). This type of research attempts to capture data through flexible and non-standardized methods such as in-depth interview to find out what people are doing and thinking (Pope and May 2001; Pope *et al.* 2000). Qualitative research may also be used to explore the substantive area about which little is known in order to gain a fuller understanding (Pope and May 2001; Pope *et al.* 2000).

Analytical studies aim to quantify the relationship between the effect of an intervention or exposure on an outcome (Centre for Evidence-based Medicine 2012). In order to be able to quantify the effect it is necessary to know the number of events or rate of events in the intervention or exposure group compared to the comparator or control group. The researcher may actively manipulate the factors in *experimental studies* (RCTs) or simply measures the events in *observational studies* (cohort studies, case control).

Table 7.2 gives a brief overview of study design and their advantages and disadvantages.

Table 7.2 Study design advantages and disadvantages

Study type	Design	Advantages	Disadvantages
Randomized controlled trial	An experimental comparison study in which participants are allocated to treatment or intervention or control/ placebo groups using a random mechanism. Best type of study for an intervention	<ul style="list-style-type: none"> ● Unbiased distribution of confounders ● Blinding more likely ● Randomization facilitates statistical analysis 	<ul style="list-style-type: none"> ● Expensive: time and money ● Volunteer bias ● Ethically problematic at times
Crossover design	A controlled trial where each study participant has both therapies, e.g. randomized to treatment A first, then treatment B at the crossover point. Only relevant if the outcome is reversible with time, e.g. symptoms	<ul style="list-style-type: none"> ● All subjects serve as their own controls and error variance is reduced, thus reducing the sample size needed ● All participants receive treatment (at least some of the time) ● Statistical tests assuming randomization can be used ● Blinding can be maintained 	<ul style="list-style-type: none"> ● All subjects receive placebo or treatment at some point ● Washout period lengthy or unknown ● Cannot be used for treatment with permanent effects
Cohort study	Data are obtained from groups who have been exposed or not exposed to the new technology or factor of interest (e.g. from the databases). No allocation of exposure is made by the researcher. Best for study of predictive risk factors of an outcome	<ul style="list-style-type: none"> ● Ethically safe ● Participants can be matched ● Can establish timing and directionality of events ● Eligibility criteria and outcome assessment can be standardized ● Administratively cheaper and easier than RCT 	<ul style="list-style-type: none"> ● Controls may be difficult to identify ● Exposure may be linked to a hidden confounder ● Blinding is difficult ● Randomization is not present ● For rare diseases, large sample sizes or long follow-up necessary
Case control studies	Patients with a certain outcome or disease and an appropriate group of controls without the outcome or disease are selected (usually with careful consideration of appropriate choice of controls, matching, etc.) and then information is obtained on whether the subjects have been exposed to the factor under investigation	<ul style="list-style-type: none"> ● Quick and cheap ● Only feasible method for rare disorders or those with long lag between exposure and outcome ● Fewer subjects needed than cross-sectional studies 	<ul style="list-style-type: none"> ● Reliance on recall or records to determine exposure status ● Confounders ● Selection of control group difficult ● Potential bias: recall selection

(continued)

Table 7.2 (continued)

Study type	Design	Advantages	Disadvantages
Cross-sectional survey	A study that examines the relationship between disease (or other health-related characteristics) and other variables of interest as they exist in a defined population at one particular time (i.e. exposure and outcomes are both measured at the same time. Best for quantifying the prevalence of disease or risk factor, and for quantifying the accuracy of a diagnostic test	<ul style="list-style-type: none">● Cheap and simple● Ethically safe	<ul style="list-style-type: none">● Established association at most, <i>not</i> causality● Recall bias susceptibility● Confounders may be unevenly distributed● Neyman bias● Group sizes may be unequal

Modified from the Centre for Evidence-based Medicine (2012): Study Designs: <http://www.cebm.net/index.aspx?o=1039>. Accessed 23/08/2012. Reproduced with permission.

In order to standardize and improve the quality of reporting of studies, various consensus guidelines have been produced, e.g. CONSORT (2010) for the reporting of RCTs, STROBE (2012) for the reporting of observational studies, and PRISMA (superceding QUORUM) (Moher *et al.* 2009) for the reporting of systematic reviews. These are not meant to be used to assess the quality of a study; rather they are a guide to conduct and reporting.

Systematic reviews

Table 7.2 presented an outline of primary research studies. A *primary* research study is one that gathers study data at first hand (e.g. RCT or cohort study) and a *secondary* research study is one that summarizes and attempts to draw conclusions from other primary studies (Greenhalgh 2006). A systematic review is an example of a secondary research study and has been defined by the Cochrane Collaboration (2012) as ‘a high-level overview of primary research on a particular research question that tries to identify, select, synthesise and appraise all high quality research evidence relevant to that question in order to answer it’. Essentially it involves using an explicit search and appraisal methodology to

the selection of studies, synthesis, and reporting. The characteristics and stages of a systematic review are presented in Box 7.5.

Statistical analyses may be included in a systematic review if it is feasible and appropriate to do so. A meta-analysis is a statistical method used to integrate the results of included studies in a systematic review (Moher *et al.* 2009). A meta-analysis will allow an objective appraisal of the evidence, should provide a more precise estimate of treatment effect, and may explain some of the heterogeneity (consistency of results) across studies, but poorly conducted meta-analyses may increase bias by excluding relevant studies and including poor quality studies (Egger 1997). It is important that the quality assessment of the included studies (their characteristics and limitations) are integrated with the statistical analysis. In order to conduct a meta-analysis, the results from individual studies have to be expressed in a standardized format to allow comparisons to be made. Box 7.6 includes definitions of the common terms used for binary outcome measures of effect size: relative risk ratio and odds ratio and number needed to treat (NNT).

Cumulative meta-analysis is defined as the repeated performance of the meta-analysis whenever a new trial

Box 7.5 Characteristics and stages of a systematic review

- 1 A systematic review will formulate a specific research question, a set of clearly stated objectives, and predefined eligibility criteria for inclusion of studies.
- 2 An explicit predefined reproducible methodology is designed and finalized *a priori*.
- 3 A systematic search of the literature is conducted to identify all studies that would meet the inclusion criteria. This will involve searching of medical databases and hand searching of journals, and in some cases this may involve contacting authors of published papers to obtain further details not presented in the publication. It will also involve searching the 'grey literature' such as unpublished clinical reports and theses. It should also involve translation of studies published in languages other than English.
- 4 The literature is critically appraised and assessed for validity and relevance. Studies are assessed against strict risk of bias criteria.
- 5 The findings are presented and synthesized in a systematic way and details of the included studies and their characteristics are presented. The analysis of results may involve (if feasible and appropriate) statistical synthesis of results using meta-analysis.

(Higgins and Green 2012.)

Box 7.6 Outcome measures definitions

Event rate is the number of people experiencing an event expressed as a proportion of people in the population.

Risk is the probability that an adverse health event will occur and is usually expressed between 0 or 1, e.g. if the risk is 0.2 in a sample of 100 people, 20 people in every 100 will have the event.

Control event rate (CER) is the risk of the event in the control group.

Experimental event rate (EER) is the risk of the event in the experimental group.

Absolute risk reduction (ARR) = EER – CER.

Relative risk reduction (RRR) = EER – CER/CER. This is the proportional reduction in risk between the rates of events in the control group and the experimental group. The RRR tends to be bigger than the ARR and may exaggerate the effect.

Number needed to treat (NNT) = $1/ARR = 1/EER - CER$. This is the number of patients who have to be

treated in order to prevent a harmful outcome in one patient.

Odds is the ratio of probability of the event occurring against the probability that the event will not occur, expressed as:

Odds of the outcome event/odds of no event in the control group.

Odds of the outcome event/odds of no event in the experimental group.

Confidence interval is a measure of the precision of the results of the study. It will provide a range of probabilities within which the true result will lie, 90–95% of the time. Wide intervals indicate lower precision, whereas narrow intervals indicate greater precision.

Modified from Greenhalgh 2006, p. 220, Appendix 2, *How to read a paper: the basics of evidence-based medicine*, 3rd edition. London: Blackwell Publishing and BMJ Books. Reproduced with permission.

becomes available for inclusion (Egger and Davey Smith 1997). A cumulative meta-analysis could retrospectively identify the point in time when a treatment effect from an intervention first reached conventional significance. Indeed, Egger (1997) cites the example of Lau *et al.* who demonstrated that trials of intravenous streptokinase in acute myocardial infarction had shown a 20% reduction in death as early as 1973. The

subsequent 25 studies that enrolled a further 34,542 patients only served to reduce the significance level and confidence interval around the original estimate of 20% (Lau 1992).

Individual patient or participant data (IPD) is a meta-analysis that uses individual patient data collected from the original relevant trials. It requires that researchers make available the original data from a trial and requires

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considerable collaboration between the researchers and is more expensive and time consuming. The approach is the same as for a traditional meta-analysis.

Guidance on the standardizing and reporting of systematic reviews is given in the PRISMA statement (Preferred, Reporting Items for Systematic reviews and Meta-Analysis (Moher et al. 2009)). While it is not advocated that it be used for appraisal purposes, it does give detailed guidance on quality standards that should be met in reporting systematic reviews. The statement gives a 27-item checklist and four flow diagrams which give a thorough overview of the process and conduct of a systematic review. In addition, the Centre for Reviews and Dissemination (CRD) (2008) and National Institute for Health and Clinical Excellence (NICE) (2009) have given specific guidance on the conduct of systematic reviews for particular types of intervention, e.g. public health guidance and diagnostics tests. The Cochrane Collaboration also gives detailed guidance and regularly updates its handbook (Higgins and Green 2011), available in the Cochrane Library (<http://www.cochranelibrary.com>). Systematic reviews and controlled trials in relation to dentistry and oral health may be accessed through the Oral Health Group (<http://www.ohg.cochrane.org>).

Levels of evidence (the hierarchy of evidence)

There is a recognized hierarchy (levels of evidence) in the assessment of what constitutes good clinical research evidence. The levels reflect the rigour of the methods used. Guyatt *et al.* (1995a) devised a

hierarchy that assigned the relative weight to different primary and secondary studies when making decisions about a clinical intervention. Level I evidence is considered to be the most rigorous and the least likely to be biased; Level IV uses the least rigorous of methodologies and is most susceptible to bias. Box 7.7 presents a simplified version of the hierarchy of evidence; for a more detailed elaboration go to <http://www.cebim.net/?o=1116>. The levels of evidence comprise primary and secondary research studies. Top of the hierarchy of evidence is the systematic review.

The most common types of questions related to clinical activities are questions about therapy, diagnosis, prognosis, and causation/harm. Sackett *et al.* (2000) devised a shorthand to link these category questions to the study that would best answer the question, which is illustrated in Box 7.8. This is a useful shorthand, but use it with caution as some authors have suggested that now that RCTs are becoming commonplace to test diagnostic tests, strategies, and the usefulness of prognostic information, this approach is limiting (Wyler and Silva 2009).

Box 7.7 Types of evidence

Type I At least one good systematic review (including at least one RCT).

Type II At least one good RCT.

Type III Well-designed interventional studies without randomization.

Type IV Well-designed observational studies.

Type V Expert opinion, influential reports, and studies.

Box 7.8 Broad fields of research

Therapy (testing the efficacy of a clinical intervention): the preferred study design is the *randomized controlled trial*.

Diagnosis (testing whether a new test is reliable and valid): the preferred study design is a *cross-sectional survey*.

Screening: (demonstrating the value of a test that can be applied at a population level): the preferred study design is a *cross-sectional survey*.

Prognosis (following patients whose disease is picked up at an early stage): the study design of choice is a *longitudinal cohort study*.

Causation: (determining whether a putative harmful agent is related to the development of disease): the preferred study is a *cohort or case control study*.

Modified from Greenhalgh 2006, p. 46, Chapter 3. *How to read a paper: the basics of evidence-based medicine*, 3rd edition. London: Blackwell Publishing and BMJ Books. Reproduced with permission.

Access the literature and locate the best evidence available

Richards and Lawrence (1995) suggest that there are four basic routes to finding the evidence: ask an expert, read a textbook, find the relevant article in your reprint file, or search a database such as MEDLINE. Asking an expert is a good starting point, but they may not be completely aware of all the up-to-date evidence, and often hold quite subjective opinions about particular issues. Reading a textbook seems like a good idea, but there is evidence that they rapidly go out of date, even when new (Altman 1991). Finding the relevant article in your reprint file also sounds a good idea, but you may not have a relevant reprint and even if you do you never get around to reading it properly. Searching a database would appear to be the best way to gather the evidence, as it will be the most up-to-date and quite comprehensive.

Accessing the literature has become much easier given the development in search engines, electronic medical databases, and the sheer volume of published literature available on open access. The PICO question items will help identify the search terms that will determine the search strategy. Enlisting the help of an information specialist from the medical and dental library is the best way to learn about searching and using medical databases. There are two possible sources of evidence: primary and secondary sources. The Centre for Evidence-based Medicine (2011) recommends using methodological filters to target the correct study when searching for primary sources (see Box 7.8 for the terms to use). The filters are usually based on the term for the study design (e.g. RCT) or words indicating a good quality design (e.g. likelihood ratio) (Greenhalgh 2006).

Box 7.9 presents a summary of the type of secondary sources available to the searcher, including systematic reviews and evidence-based summaries. All have been appraised and summarized by others from primary sources and some have been adapted to facilitate clinical application. There are numerous sites providing evidence-based guidelines for clinical practice, such as the National Institute for Health and Clinical Excellence (NICE) (<http://www.nice.org.uk/>) and Scottish Intercollegiate Guidelines Network (SIGN) (<http://www.sign.ac.uk/>). Evidence-based summaries are also available that update and synthesize clinical evidence in a readily accessible format for use in clinical practice (e.g. see Clinical Evidence website). The Cochrane Library holds two databases of systematic reviews: the Cochrane Database of Systematic Reviews (CDSR) and Database of Abstracts of Reviews of Effectiveness (DARE-2). It also maintains a controlled trial register (CENTRAL-2). Figure 7.3 presents an approach to searching for evidence developed by the CEBM (2012). A detailed description of the many approaches to use in conducting a search is not possible within this text; however, the reference section of this chapter lists some useful websites to help get the novice searcher started.

Appraise the literature

Many papers published in medical journals have serious flaws (Greenhalgh 2006) and it is important to be able to identify a good article and know whether you can trust the results or whether you need to use some discretion with applying the findings. You cannot assume that an article appearing in a respected, peer-reviewed medical journal contains reliable information

Box 7.9 Secondary sources

- **Guidelines:** NICE; SIGN; US National Guideline Clearinghouse; Canadian Medical Association; New Zealand Guidelines Group
- **CATs:** CAT Crawler
- **Evidence-based summaries:** Bandolier, Clinical Evidence

- **Structured abstracts:** EBM Online, ACP Journal Club
- **Systematic reviews:** Cochrane Library

From: Centre for Evidence-based Medicine (2011) Finding the evidence at <http://www.cebm.net/index.aspx?o=1038>. Accessed 6/08/2012. Reproduced with permission.

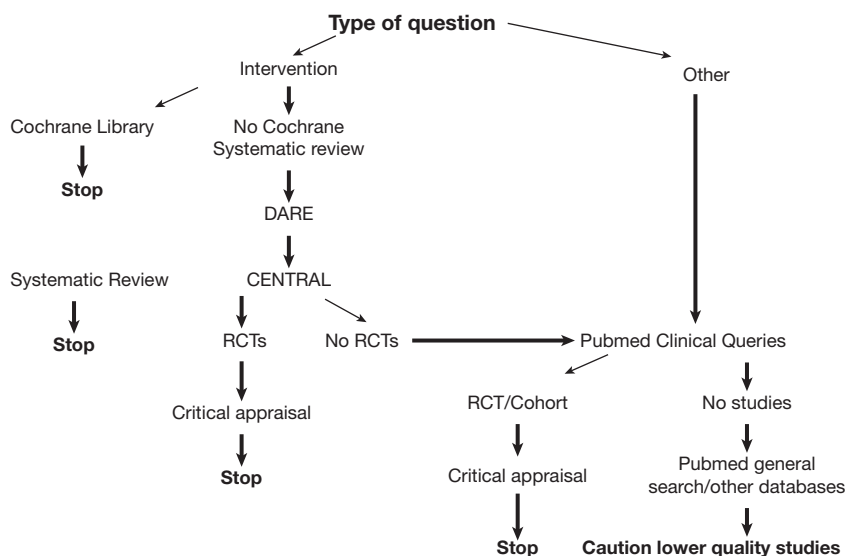


Figure 7.3 An outline of conducting a search.

Modified from the Centre for Evidence Based Medicine (2012): Searching the literature: <http://www.cebm.net/index.aspx?o=1039> accessed 07/09/2012. Reproduced with permission.

(Altman 2000). Critical appraisal is the process of 'carefully and systematically examining research to judge its trustworthiness, and its value and relevance in a particular context' (Burlis 2009, p. 2). Critical appraisal skills are essential for clinicians in order to be able to both find and use reliable research evidence. In order to be able to do this, they need to determine whether the study has been undertaken in a way that makes the results reliable; they need to be able to make sense of the results; and finally they need to be able to apply the results within the context of the decision they are making (Burlis 2009). The methodological conduct of the study is key to determining the reliability of the study, particularly the elimination of bias.

Validity and relevance

Before a detailed appraisal of the reported study is undertaken, it is important to have a quick perusal to screen the publication to ensure it is worth continuing in detail. The Critical Appraisal Skills Programme (CASP 2012) suggests three screening questions that largely determine whether the study results appear to be valid and whether it is worthwhile reviewing the

paper in detail: Did the study address a clearly focused issue? Did the authors use an appropriate method to answer the question? Is it worth continuing?

If you decide it is worth continuing, the next stage is to assess whether the results are valid. Key to this is the assessment of bias. Bias is the 'systematic deviation of the results of a study from the truth because of the way it has been conducted, analysed and reported' (quoted in Burlis 2009). Bias can distort the findings of a study by overestimating or underestimating the effect of an intervention or the extent of a relationship. Potential sources of bias are presented in Box 7.10. A study that has minimized bias sufficiently is said to have *internal validity*.

Determining the validity of the results is essentially a balance between the opportunities for bias (weaknesses) and the effect this might have had on the outcomes (Monash 2006). The reader must also make an assessment of the relevancy and comprehensiveness of the outcomes and whether the size of the effect is important for patients. It is also important to assess the precision of the effect, i.e. is it likely that the effect is not due to chance? (Monash 2006). Based on the observed result and size of the sample, a confidence

Box 7.10 Potential sources of bias

Selection bias Bias in how participants may be selected (ideally random sequence generation) and allocated (ideally allocation concealment) to the study or to groups in the study.

Performance bias Participants and personnel are not blinded to the participant allocation; also there may be unequal provision of care apart from the intervention under study.

Detection bias There is bias and lack of blinding in the assessment of the outcome.

Attrition bias Incomplete reporting of loss to follow-up and withdrawals, leading to incomplete reporting of outcomes.

Selective reporting bias Selective reporting of outcomes.

interval can be calculated. It will provide a range of probabilities within which the true result will lie, 90–95% of the time. A most important advantage of the confidence interval is that it can also help determine whether a trial is definitive or not (Guyatt *et al.* 1995b).

In considering the relevancy of an efficacy study to clinical practice, it is important to consider whether the patients reported upon are similar to your clinical population. Are similar definitions of disease and severity used? Were all outcomes considered? Are similar care protocols followed? Is the health system similar? Are there other important differences? (Monash 2006). While costs are not generally reported in a trial, it is important to consider the costs, particularly if the effect is small or if there is potential for harm and adverse events (Burl 2009). Many studies now report number needed to treat (defined in Box 7.6), which will allow some rough estimates to be made.

Critical appraisal tools

There are numerous appraisal tools and checklists available to help the reader assess the quality of the methods used to conduct the study and to help assess the validity of the results. There are excellent tools available from the Critical Appraisal Skills Programme (CASP) (<http://www.sph.nhs.uk/what-we-do/public-health-workforce/resources/critical-appraisals-skills-programme>), the Centre for Evidence-based Medicine (<http://www.cebm.net/>), and the Centre for Evidence-based Dentistry UK (<http://www.cebd.org/>), which give detailed guidance and support on critical appraisal for individual study designs (both qualitative and quantitative).

Many papers have minor, and some may have major, faults. The objective of critical appraisal is not to make spurious criticism; it is to decide whether a flaw is serious enough to compromise the methodology and therefore the results obtained, the generalizability of the paper, and the applicability to clinical practice. Finally, remember that the reporting of an unsuccessful outcome is as important to clinical practice as a successful outcome. However, many journals do have a bias towards papers reporting positive outcomes—so-called *publication bias*.

Applying and acting on the evidence

It is widely acknowledged that getting evidence into clinical practice is often slow and lags behind the publication of authoritative treatment guidelines. There have been numerous critiques of EBP, not least that the evidence derived from RCTs involving healthy volunteers will lack generalizability to patient populations who are older, ethnically diverse, and experiencing a wide range of comorbidities. In order to implement evidence, the clinician must weigh up the global evidence with his/her experience of treating patients in particular settings, the care protocols used and recorded, and the context of patients' lives, which could affect adherence and outcome (Cameron Hay *et al.* 2008). The integration of evidence with clinical practice involves: becoming accurate and efficient in adjusting critical appraisal measures to individual patients, e.g. using NNT; explaining and resolving disagreement about management decisions in relation to this integration; and undertaking clinical decision analyses and audit of diagnostic, therapeutic,

and other EBP performance (KTA Clearinghouse 2012a). Clinical practice should be informed by the evidence, but not solely driven by the evidence.

In order to get evidence into practice, numerous organizations and specialist societies have produced clinical guidelines that summarize research evidence, e.g. NICE and SIGN. Guidelines have been defined by the Institute of Medicine (1992) as 'systematically development statements to assist practitioner decisions about appropriate health care for specific clinical circumstances'. The implementation of guidelines in practice is influenced by: where and how the guideline was produced; how it is brought to the attention of clinicians; how clinicians are prompted and supported to implement the guidelines; and the way in which guidelines are presented to the clinician (Greenhalgh 2006). The Cochrane Effective Practice and Organisation of Care Group (EPOC) (2010) has undertaken work to summarize interventions that have been effective at changing professional practice. Simply telling clinicians about EBP is consistently ineffective at changing practice, and while information is *necessary* to change clinical practice, it is rarely *sufficient* (Greenhalgh 2006). Complex multi-method processes are no more successful than a simple single method, and it would appear that many interventions and strategies to change clinicians' behaviours have lacked any psychological theoretical underpinning.

Abt and colleagues (2012) have suggested a simplified approach to translating research into clinical dental practice. This involves developing a strategy and plan for change with members of the whole dental team, focusing on *why* and *when* change is needed, and an understanding of the practice's culture in terms of accommodating change. This step is followed by identifying the need for change and barriers to change. It is recommended that a range of strategies are used to carry out the change, which should include audit combined with feedback.

Assessing and evaluating performance

The final stage of EBP is assessing and evaluating performance in relation to the first four steps. The KT Clearinghouse (2012a) provides a detailed checklist for clinicians to self-evaluate their performance in relation

to the EBP tasks. These include self-assessment on skills to: ask an answerable question; find the best external evidence; appraise evidence for validity and potential usefulness; integrate critical appraisal with clinical expertise; apply in clinical practice; teach EBP to colleagues; and continue professional development.

DISCUSSION POINTS 1

Choose a clinical procedure that you have undertaken in the last month. Search for guidelines and other summary evidence. How does the care you provided match up to the evidence you found? What would you do differently (if anything) next time?

Evidence-based public health and guidelines

Public health is broad and diverse, encapsulating disease prevention, health promotion, and health protection for individuals and populations (Kelly *et al.* 2009). NICE is an independent UK organization charged by the UK Government to give independent advice on public health practice from health promotion and public education campaigns, the uptake of immunization and screening, to community development activities (NICE 2009). NICE has produced a detailed overview of the methods and processes the organization uses in developing public health guidance. Six principles underpin its approach and are summarized in Box 7.11. NICE advocates the transparent assessment and quality review of quantitative and qualitative research, with evidence synthesized on the basis of strength, direction, and size of effect and applicability (NICE 2009). Recommendations are developed informed by evidence, but are set within a framework acknowledging a range of social values, taking account of theories of public health and behaviour change. They should also reflect the views and experiences of those being advised to take action and the people who may be affected by that action (NICE 2009). NICE guidance of relevance to the practice of dentistry includes guidance on: extraction of wisdom teeth, antibiotic prophylaxis for the prevention of infective carditis, dental radiographs, and dental recalls.

Box 7.11 Principles of framing public health guidance

- Determinants of disease are broader than but include biomedical causes.
- Determinants operate in a patterned way and reflect inequalities in society.
- Determinants operate through causal pathways.
- Understanding these causal pathways can aid identification and prevention of the causes of diseases.
- Causal pathways exist for the promotion of health.
- Positive and negative casual pathways cross biological, physical, and social boundaries.

Modified from NICE 2009.

The limitations of EBP

The introduction of EBP has not been embraced wholeheartedly by all clinicians and academics. It is claimed that EBP creates a 'cook-book' approach to clinical care, does not give due recognition to clinical expertise, ignores patients' views, and could be used as a cost-cutting tool. Many of the guidelines on a clinical topic are not implemented widely and go out-of-date quickly. A recent systematic review of teaching of critical appraisal skills in health care settings concluded that while teaching of appraisal may improve health professionals' knowledge, there was little evidence that it had led to changes in the process of care or to changes in patient outcomes (Horsley *et al.* 2011). EBP itself displays three of the shortcomings of medical sciences: a shortage of coherent and consistent evidence; difficulties in applying global evidence to an individual patient; and barriers to the practice of high quality clinical care (KT Clearinghouse 2012b). There are three further limitations particular to EBP itself: the need to possess searching and critical appraisal skills; the limited time clinicians have to develop and practise these skills; and the resources to allow immediate access to information in clinical settings are few (KT Clearinghouse 2012b).

Nevertheless, it is clear, on examination of the steps of EBP, that the role of the clinician in exercising his/her clinical intuition is emphasized, as is the need to tailor any care plan to patient values and concerns. EBP, far from being a tool to cut services, has provided evidence that some types of care can maximize a patient's quality of life and has led to increases in costs of patient care (KT Clearinghouse 2012b). EBP allows more efficient use of scarce resources. Horsley *et al.* (2011) concluded that

'absence of evidence is not evidence of absence' of an effect of EBP on clinical care and patient outcomes, and suggested that more high quality research was required to explore the effects in detail. Indeed, short- and long-term evaluation of undergraduates exposed to 'problem-based learning' and EBP suggests that those exposed to it show substantial improvements in their ability to 'generate and defend clinical and management decisions'. They also retain those skills after qualification and during time spent in the real world of clinical practice (Sackett and Rosenberg 1995).

Conclusion

EBP involves the systematic collection and incorporation of research evidence into clinical practice, to improve the quality and effectiveness of interventions for consumers and providers of health care. It has implications for the delivery of health care at both the individual, community, and population level. Evidence-based practice involves the integration of best research evidence with clinical expertise and patient values (Sackett *et al.* 1996b). Clinical practice should therefore be evidence informed rather than evidence driven.

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Wyer, P.C. and Silva, S.A. (2009). Where is the wisdom? I—A conceptual history of evidence-based medicine. *Journal of Evaluation of Clinical Practice*, **15**(6), 891–8.

Further reading

Greenhalgh, T. (2006). *How to read a paper: the basics of evidence based medicine*, 3rd edition. London, BMJ Books Blackwell.

Useful websites

American Dental Association, Evidence-based dentistry: <http://www.ebd.ada.org/>.

Bandolier: <http://www.medicine.ox.ac.uk/bandolier/>.

Centre for Evidence-based Dentistry UK: <http://www.cebd.org/>.

Centre for Evidence-based Medicine, University of Oxford: <http://www.cebm.net/index.aspx?o=1000>.

Clinical Evidence: <http://www.clinicalevidence.com/>.

Database of Abstracts of Reviews of Effectiveness (DARE): <http://www.crd.york.ac.uk/CRDWeb/AboutDare.asp>.

Evidence-based Health Care: <http://www.ebmny.org/pubs.html>.

Florida State University College of Medicine: <http://med.fsu.edu/index.cfm?page=medicalinformatics.ebmTutorial>.

Infopoems (searchable database of POEMS (Patient Oriented Evidence that Matters) from the *Journal of Family Practice*): <http://www.jfponline.com/Collection-Content.asp?CollectionID=48>.

National Institute of Health and Care Excellence (providing data from the former National electronic Library for Medicines (NeLM)) available at: <http://www.evidence.nhs.uk/>.

National Institute for Health and Clinical Excellence: <http://www.nice.org.uk>.

NHS Centre for Reviews and Dissemination, University of York: <http://www.york.ac.uk/inst/crd>.

PubMed: <http://www.pubmed.gov/>.

Scottish Intercollegiate Guidelines Network: <http://www.sign.ac.uk>.

SumSearch: <http://sumsearch.org/>.

The Cochrane Collaboration: <http://www.cochrane.org/>.

The Cochrane Collaboration Oral Health Group: www.ohg.cochrane.org/.

The Cochrane Library: <http://www.thecochranelibrary.com/>.

The UK Cochrane Centre, University of Oxford: <http://www.ioxfordshire.co.uk/profile/368639/Oxford/The-UK-Cochrane-Centre/>.

The UK Cochrane Collaboration: <http://www.ukcc.cochrane.org/>.

Turning Research Into Practice (TRIP) database: <http://www.tripdatabase.com/>.

Critical appraisals tools

Centre for Evidence-Based Dentistry UK: <http://www.cebd.org/>.

Centre for Evidence-Based Medicine: <http://www.cebm.net/>.

Critical Appraisal Skills Programme (CASP): <http://www.sph.nhs.uk/what-we-do/public-health-workforce/resources/critical-appraisals-skills-programme>.

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Guidance on searching the literature

Centre for Evidence-Based Medicine, Oxford: <http://www.cebm.net/index.aspx?o=1038>.

University of California: http://www.missinglink.ucsf.edu/lm/EBM_litsearch/.

3 Prevention and oral health promotion

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8 Principles of oral health promotion

CHAPTER CONTENTS

Introduction

Historical development of health promotion

Definition and principles of health promotion

Oral health promotion in action

Differing approaches to health promotion

Moving upstream

Health promotion settings

Evidence-based health promotion

Principles of evaluation

Oral health promotion strategies

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Provide a definition of oral health promotion.
- Outline the key principles of oral health promotion.
- Describe the five areas for action outlined in the Ottawa Charter and provide oral health examples of each.
- List potential partners and settings for oral health promotion.
- Outline key findings of the effectiveness of reviews of oral health promotion.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- Determinants and definitions of health (Chapters 2 and 3).
- Public health approaches to prevention (Chapter 4).
- Overview of behaviour change (Chapter 9).
- Oral health education in dental practice settings (Chapter 10).

Introduction

Dental diseases affect a large number of people, cause much discomfort and pain, and are costly to treat. Their impact is therefore considerable, to both the individual and wider society (see Chapters 3 and 21 for a more detailed overview of oral health impacts). A particular concern is the pervasive nature of oral health inequalities with the burden of oral diseases now increasingly experienced amongst less educated and socially excluded groups in society. The causes of dental diseases are well known and effective preventive measures have been identified. However, treatment services still dominate oral health systems around the world. There is growing recognition within the dental profession that treatment services will never successfully treat away the causes of dental diseases (Blinkhorn 1998). In the *Lancet*, one of the top medical journals, an editorial on oral health highlighted the need to reorient dental services towards prevention (*Lancet*

2009). What type of preventive approach should be adopted to promote oral health and reduce inequalities? It is essential that preventive interventions address the underlying determinants of oral disease and inequalities to achieve sustainable improvements in population oral health. Effectiveness reviews of clinical preventive measures and health education programmes have highlighted that these approaches do not reduce oral health inequalities and only achieve short-term positive outcomes. A radically different preventive approach is therefore needed.

DISCUSSION POINTS 1

Based upon what you have read in Chapters 1 and 2, outline the reasons why prevention is given such a low priority within the NHS?

If treatment services and traditional clinical preventive approaches are not capable of dealing effectively with dental diseases, then other options need to be considered. In recent decades, the health promotion movement has arisen, partly in response to the recognized limitations of treatment services to improve the health of the public. With escalating costs and wider acceptance that doctors and dentists are not able to cure most chronic conditions, increasing interest has focused on alternative means of dealing with health problems.

Historical development of health promotion

The origins of health promotion date back to the work of public health pioneers in the 19th century. At that time, rapid industrialization led to the creation of poor and overcrowded working and living conditions for the majority of the working classes in the large industrial towns and cities of Europe and North America. These appalling social conditions inevitably led to epidemics of infectious disease, which spread through the population and were considered a threat to social stability. Eminent social reformers such as Edwin Chadwick and Southwood Smith highlighted the need to improve social conditions through municipal reform. In 1875 a UK Public

Health Act was passed to control water supply, sewage disposal, and animal slaughter within British industrialized towns and cities. Such measures had a significant effect on reducing the prevalence of infectious diseases long before clinical medicine had even discovered the pathogenic nature of these infections, or antibiotics.

By the late 19th century, as the threat of disease epidemics receded, the focus had begun to shift away from environmental measures for improving health to measures that highlighted the importance of educating individuals against the hazards of disease. This educational approach became increasingly dominated by the medical profession and as a result more disease-specific. Information campaigns, often using shock methods, were targeted at high-risk groups in an attempt to change personal habits and behaviours.

In 1974 the then Canadian Minister of Health, Marc Lalonde, published *A new perspective on the health of Canadians*, in which he argued that the major causes of death and disease were due to environmental causes, individual behaviours, and lifestyle factors rather than to biomedical characteristics (Lalonde 1974). This document was enormously influential in shifting the emphasis away from an individual biochemical focus to the wider public health agenda once again. It consequently led WHO to organize a series of international health promotion conferences which facilitated the development and practice of the modern health promotion movement. The first of these WHO conferences, in Ottawa in 1986, was particularly important in defining the meaning and potential of health promotion (WHO 1986). Subsequent WHO international conferences have further developed and expanded the principles and practice of health promotion.

The Ottawa Charter outlined five key areas of action as follows:

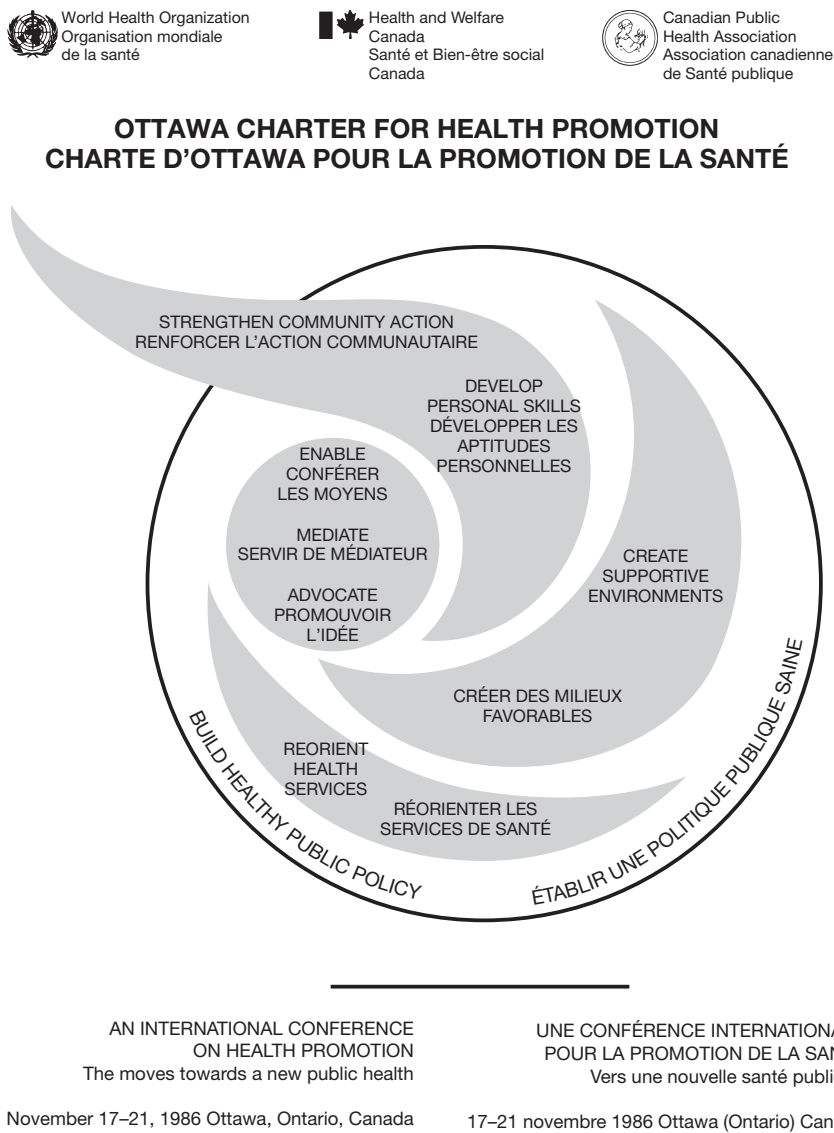
- 1 Create supportive environments:** recognizing the impact of the environment on health and identifying opportunities to make changes conducive to health.
- 2 Build healthy public policy:** focusing attention on the impact on health of public policies from all sectors, and not just the health sector.
- 3 Strengthen community action:** empowering individuals and communities in the processes of

setting priorities, making decisions, and planning and implementing strategies, to achieve better health.

4 Develop personal skills: moving beyond the transmission of information, to promote understanding, and supporting the development of personal, social, and political skills that enable individuals to take action to promote health.

5 Reorient health services: refocusing attention away from the responsibility to provide curative and clinical services towards the goal of health gain.

These key areas provide a useful range of actions to encompass the width and diversity of approaches needed in health promotion (Figure 8.1). Later in this chapter the scope of each of these areas will be explored with reference to oral health.



Definition and principles of health promotion

A variety of definitions of health promotion have been proposed which highlight subtle differences in approach and emphasis. The WHO (1984) definition, however, captures the spirit and meaning well:

Health promotion has come to represent a unifying concept for those who recognize the need for change in the ways and conditions of living in order to promote health. Health promotion represents a mediating strategy between people and their environments, synthesizing personal choice and social responsibility in health to create a healthier future.

Health promotion has three important core elements:

- Focus on tackling the determinants of health and inequalities.
- Working in partnership with a range of agencies and sectors.
- Adopting a strategic approach utilizing a complementary range of actions to promote the health of the population.

The term oral health promotion is now widely used but often incorrectly. Box 8.1 outlines the underlying principles of oral health promotion to clarify the exact meaning of this term.

Determinants of health

Health promotion focuses on the determinants of health, both the socio-economic and environmental factors, plus the individual health-related behavioural elements. (See Chapter 2 for a full account of the determinants of health.) It therefore attempts to avoid a victim-blaming approach by recognizing the limited control many individuals often have over their health. In the past, health professionals have ignored the complex array of factors that influence and determine human behaviour and have as a result wrongly assumed that individuals are always capable of modifying elements of their lifestyle. Such a restricted and narrow approach has most often not achieved the desired changes in behaviour. A major emphasis in health promotion is therefore *to make the healthy choices the easy choices* by focusing attention upstream (Milio 1986).

The fundamental determinants of oral health are related to the consumption of non-milk extrinsic

Box 8.1 Principles of oral health promotion

Empowerment: interventions should enable individuals and communities to exert more control over the personal, socioeconomic, and environmental factors that affect their oral health.

Participatory: key stakeholders should be encouraged to be actively involved in all stages of planning, implementing, and evaluating interventions.

Holistic: interventions should adopt a broad approach, focusing upon the common risks and conditions that determine oral and general health and inequalities.

Intersectoral: partnership working across all relevant agencies and sectors is essential to ensure that oral health improvement is placed upon the wider public health agenda.

Equity: the need to focus action on addressing oral health inequalities should be of paramount importance in the planning of interventions.

Evidence base: existing knowledge of effectiveness and good practice should be the basis for developing future oral health improvement interventions.

Sustainable: achieving long-term improvements in oral health that can be maintained by individuals and communities is crucial.

Multi-strategy: tackling the underlying determinants of oral health requires a combination of complementary actions such as healthy public policies, community development, and environmental change.

Evaluation: sufficient resources and appropriate methods should be directed towards the evaluation and monitoring of oral health interventions.

Adapted from Watt 2005.

sugars (NMES) and the effective control of plaque in the mouth. Other factors that influence oral health include optimal exposure to fluoride and the appropriate use of good-quality dental care. The effects on oral health of excess alcohol consumption and smoking behaviour also need to be recognized. Although all of these factors can be modified at an individual level to promote oral health, they are clearly also influenced by complex socio-political factors that are outside the control of many individuals.

DISCUSSION POINTS 2

Upstream—downstream!

There I am standing by the shore of a swiftly flowing river and I hear the cry of a drowning man. So I jump into the river, put my arms around him, pull him to the shore, and apply artificial respiration. Just when he begins to breathe, there is another cry for help. So I jump into the river, reach him, pull him to shore, apply artificial respiration, and then just as he begins to breathe, another cry for help. So back in the river again, without end, goes the sequence. You know, I am so busy jumping in pulling them to shore, applying artificial respiration, that I have no time to see who the hell is upstream pushing them all in.

(McKinlay 1998)

In terms of health promotion, what factors are working upstream creating disease in society?

As a health promoter, what are the limitations of only working downstream?

To promote oral health, what would a reorientation upstream involve?

Working in partnerships

Community participation is an essential element of health promotion. The active involvement of the local community in all aspects, from the identification of the health issue to ways of initiating change, is a central principle. One of the key roles of health professionals is therefore in enabling and nurturing health promotion within communities.

By recognizing and focusing on the wide and diverse underlying determinants of health, multi-sectorial working is a key element of health promotion. Many

sectors in society, for example government departments, education, agriculture, health and social services, and the voluntary sector, have a significant influence on health. It is essential that these different agencies work together to ensure that health promotion policies are established, implemented, monitored, and evaluated (Box 8.2).

DISCUSSION POINTS 3

The foods and drinks people are influenced by a complex array of factors operating at varying levels. The figure below separates out these factors into individual, socio-cultural, and environmental levels. Provide at least three examples for each of these categories.

Strategic action

A strategic approach is required for the development of effective health promotion policies. A strategy should be based on an appropriate assessment of local needs and resources, which enables the development of a strategic vision with clearly stated and identified aims and targets. Many chronic diseases share common risks. For example, eating an unhealthy diet that is high in fat and sugars and low in fibre can lead to the development of obesity, coronary heart disease, and diabetes, as well as dental caries. However, it is important

Box 8.2 Partners in oral health

- Health professionals, for example doctors, health visitors, pharmacists, district nurses.
- Education services, for example teachers, school governors, parents.
- Local authority staff, for example carers, planning departments, social workers, catering staff within care homes, local politicians.
- Voluntary sector, for example Age Concern, Pre-school Learning Alliance, Terrence Higgins Trust, Mind.
- Commerce and industry, for example food retailers, food producers, advertising industry, water industry.
- Government, local, national, and international.

to move beyond the shared behavioural risks to also consider the broader social, environmental, and political factors that collectively influence oral and general health (Watt 2005). Health promotion strategies based on a common risk approach (Figure 8.2) therefore offer the potential for effectively dealing with a combination of health problems together (Sheiham and Watt 2000; Watt and Sheiham 2012). Not only can this prove to be more effective in the long term, but also it is more efficient in the use of resources. Oral health promoters need to work closely with people in general health promotion. They have a key role of placing oral health matters on the wider health promotion agenda. (The common risk factor approach is covered in greater detail in Chapter 2.)

Health promotion involves the population as a whole in the context of their everyday life, rather than focusing only on people at risk for specific diseases. It can attempt to influence the social norms within society by promoting the positive benefits of healthy behaviours. Health promotion can therefore utilize a combined whole-population strategy and a high-risk strategy

that aims to enable people to take control over, and responsibility for, their health. (Chapter 4 outlines the features of both these approaches.)

DISCUSSION POINTS 4

To successfully develop and implement a water fluoridation scheme within a district, describe the range of individuals and agencies that would need to be involved in the process.

Oral health promotion in action

Health promotion seeks to improve and protect health through a diverse variety of complementary strategies. The WHO Global Oral Health Programme has adopted a health promotion approach as the foundation for oral health improvement strategies and policies at both national and local levels (Petersen 2009). The five areas for action outlined in the Ottawa Charter provide a useful structure to explore options for promoting oral health (WHO 1986).

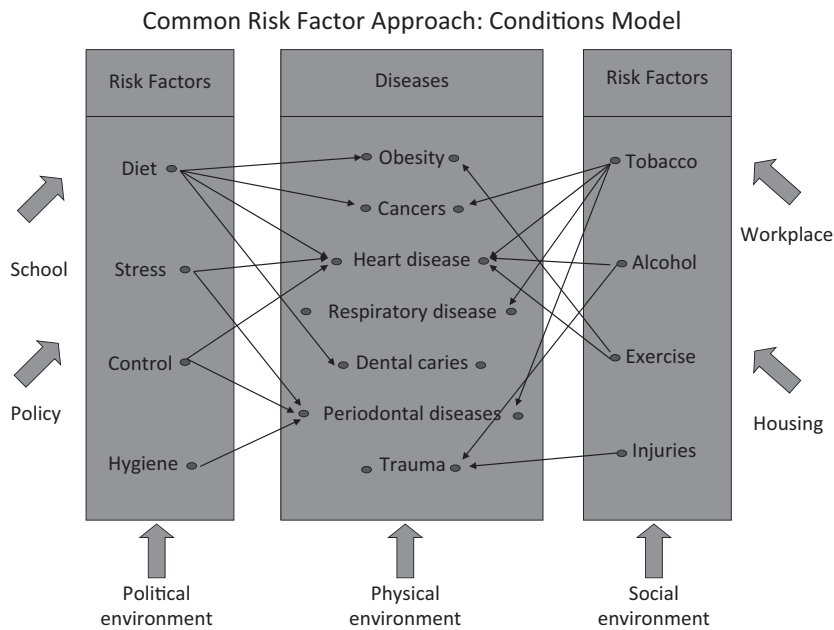


Figure 8.2 The common risk factor approach. Reproduced with permission from Watt, R.G. (2005). *Strategies and approaches to oral disease prevention and health promotion*. Bulletin of the World Health Organization.

Developing personal skills

The development of health knowledge and skills, termed health literacy, can be achieved through health education. Health education can be defined as opportunities created for learning specifically aimed at producing a health-related goal (WHO 1984). Three basic educational objectives exist:

- 1 *Cognitive*: concerned with giving information and increasing knowledge.
- 2 *Affective*: concerned with clarifying, forming, or changing attitudes, beliefs, values, or opinions.
- 3 *Behavioural*: concerned with the development of skills and actions.

Essentially, then, health education aims to equip individuals and/or communities with the necessary knowledge, attitudes, and skills to maintain and improve health. Health education can therefore be considered as one of the key strategies in health promotion that is specifically concerned with promoting some form of educational change. Health education and health promotion are not, however, the same thing. A useful way of understanding this is to consider health promotion as the 'umbrella' term, with health education as one of several supporting strategies.

Traditionally, dental health education has sought to increase patients' knowledge about the role of sugar and plaque in the aetiology of dental diseases. Initially such programmes were largely confined to schools. More recently, oral health education has extended its aims to include activities directed at not only improvements in knowledge but also the development of appropriate oral health skills. The promotion of self-care is now seen as being of fundamental importance. Health education initiatives are now also directed at a wider range of groups in society, decision-makers, and other influential groups such as health professionals, teachers, and Local Authority staff (Watt and Fuller 1999). A more radical approach to health education is developing the health literacy of politicians and government officials who ultimately have influence and control over health and social policy (Nutbeam 2008). Raising a politician's awareness

of the public health significance of oral diseases and the causes of oral health inequalities may lead to the development of more innovative government policy and action. This type of action can occur at either a local level working with community leaders or at a higher national level with government officials. (A more detailed overview of oral health education is presented in Chapter 10.)

Strengthening community action

This can be achieved through developing a community development approach (NICE 2008). This involves the mobilization of community resources, both human and material. It is a process in which the community defines its own health needs, decides how these can be best tackled, and then takes appropriate action. The advantages of this approach are that it is starting with people's concerns and is therefore likely to gain support; it focuses action on the causes of ill health identified by those affected, and the skills and confidence developed by the community can lead to sustainable improvements in health. The problems of adopting this approach include the time-consuming nature of the work, the difficulty of evaluation, and the potential conflicts that may arise within communities on setting priorities and identifying possible solutions.

Health professionals involved in community development projects need to adopt a different style of working for this approach to be successful. Rather than be the expert, they instead act as a facilitator and catalyst within the community. This requires skills in consultation, empowerment, and communication. The establishment of self-help groups, where people affected by particular oral health problems share their experiences and identify solutions, is one oral health example of community action (Fiske *et al.* 1995). A network of community cafes and food co-operatives have been established within deprived neighbourhoods in Glasgow lacking access to cheap and appealing healthy foods. Such an approach facilitates healthy food choices amongst these groups (McGlone *et al.* 1999).

Reorienting health services

The responsibility for health promotion in health services is shared among the many health professions and at the various levels of health care. All must work together towards a health care system that positively contributes to the pursuit of health. There is a need to shift resources away from the dominant treatment and curative services towards those that promote health and prevent disease. Oral health promotion is not, therefore, concerned with promoting dentistry as such. Instead, it should be involved in the development of appropriate high-quality oral care that places greater emphasis on preventive care and ways of supporting and maintaining oral health within the oral health care system.

A reorientation towards health promotion requires changes in many aspects of health services. The training and education of health professionals needs to be modified, with a greater emphasis placed on the disciplines underpinning prevention and health promotion. Funding mechanisms need to encourage and reward dentists for effective prevention, and research activities should place a higher priority on health promotion agendas. Dental professionals also need appropriate resources to support their efforts in delivering prevention in clinical settings. The Department of Health in England has produced *Delivering Better Oral Health*, which is an evidence-based preventive toolkit for clinicians to enable them to deliver a range of preventive measures (Department of Health 2012). A more detailed description of this resource is presented in Chapter 9.

Building healthy public policy

Legislative and regulatory policy passed at either national or local level can have a very powerful influence on health by creating a social environment that protects or improves health. Thus, a key element of health promotion is placing health onto the policy agendas of influential decision-makers. One oral health example is the legislation required to fluoridate public water supplies. Another is the stricter regulation on food labelling of processed food and drink. For such future legislation to be passed, dental professionals need to lobby government departments and become

involved in the political processes facilitating change. Professional organizations such as the British Dental Association could follow the lead provided by medical groups and become advocates for improvements in public policy that promote oral health. The FDI has recently produced a useful resource on oral health advocacy that outlines a range of ways in which dental professional organizations can become involved in lobbying for policy change to promote population oral health (FDI 2012).

The price of products and services is a major factor determining uptake and use. Fiscal policy is a part of health promotion that seeks to influence the costs of items influential to health. At present, unhealthy options are often cheaper than healthy alternatives. An important example of this is food and drink, where European Union subsidies are currently being directed at the production of unhealthy items such as tobacco, fatty foods, and sugar. Fiscal measures that reduce the costs of healthy products enable a larger number of people to select healthy options. Clearly, fiscal measures in the form of taxation can also be used to increase the costs of unhealthy products, therefore making them less affordable, the most obvious example being cigarettes. However, this may in fact increase pressure on the most disadvantaged groups in society who are often most heavily dependent on unhealthy products, and so such a move may ultimately result in a worsening of the health status of the poorest members of society (Marsh and McKay 1994).

Creating supportive environments

This aspect of health promotion recognizes the impact of the environment on health and seeks to identify opportunities to make changes conducive to better health. Healthy public policies can of course provide a legislative framework for environmental change, water fluoridation being a prime example. In addition to change at a national level, action can take place at a local level. For example, developing policies within local organizations such as nurseries, schools, workplaces, and hospitals that seek to promote the health of clients and staff is an important aspect of health promotion. This approach to health promotion is termed *organizational*

change. Examples could include the establishment of non-smoking areas, exercise and changing facilities, and healthy catering services where consumers can select healthy options such as sugar-free foods and drinks. The benefits to oral health of such policies are potentially great. This style of working is being actively supported by WHO through initiatives such as the Health Promoting Schools Programme (WHO 1997). The WHO Oral Health Programme has advocated the benefits of integrating oral health into Health Promoting Schools initiatives and in many countries progress is being made in this area (Kwan *et al.* 2005).

DISCUSSION POINTS 5

What are the advantages of targeting oral health education programmes at key decision-makers and influential groups such as head teachers and other health professionals, rather than directing support only at the general public?

Differing approaches to health promotion

The practice of health promotion can operate in several different ways, depending upon the philosophy and skills of the practitioner and the setting of the activity.

Five different approaches to health promotion are now discussed to illustrate the diversity of ways of working within health promotion (Figure 8.3). Oral health examples will be provided to clarify understanding. The five approaches are:

- Preventive
- Behaviour change
- Educational
- Empowerment
- Social change.

Preventive approach

The aim of this approach is a reduction in disease levels, in which medical/dental professionals take the

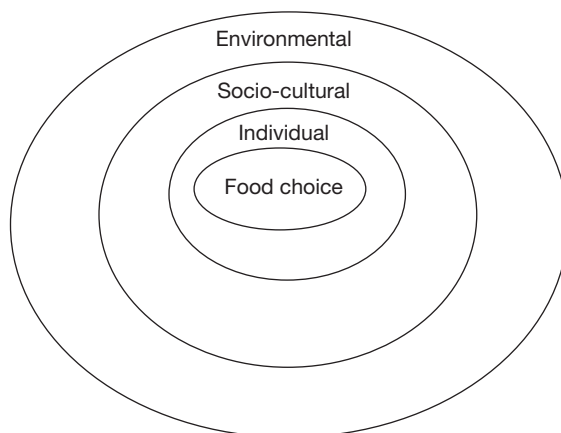


Figure 8.3 Approaches to health promotion.

lead. This approach adopts a very *top-down* authoritative style of working, with the health professionals acting as the experts and the patients being passive recipients of preventive care. Interventions such as screening tests and clinical activities such as immunization are used.

Oral health examples could include preventive measures such as fissure sealants and the establishment of a screening programme for oral cancer detection and prevention. One of the major limitations of this style of working is that it does not address the underlying causes of the disease. Therefore new cases will constantly arise and require attention.

Behaviour change

This approach aims to encourage individuals to take responsibility for their health and adopt healthier lifestyles. It is largely based upon the assumption that the provision of information will lead to a sustained change in behaviour. It is an expert-led approach utilizing a range of methods including one-to-one advice and mass media campaigns. The desired changes in lifestyle are determined by the professional and largely imposed on the patient.

Health education advice provided by dentists within surgeries aimed at improving oral hygiene practices is an example of this approach commonly adopted by the dental profession.

Educational approach

To make informed choices about their health-related behaviour, people need not only knowledge but also the skills and attitudes that support this information. The educational approach aims to provide individuals with these. However, unlike the behaviour change approach, it does not set out to persuade a person to change in a particular direction; rather, it is attempting to provide individuals with choices, which they are then able to act upon as they choose.

This approach may use a range of methods to help individuals make an informed choice about their health-related behaviour. In addition to the provision of information, opportunities to explore and share beliefs and attitudes towards health concerns may be very important. Although attitudes may be very difficult to change, having been developed throughout the person's life, group discussions or one-to-one counselling may be useful experiences to enable individuals to explore the basis of their beliefs. Although the educational approach seeks to enhance an individual's overall ability to choose a healthy lifestyle, this approach is still largely led by the expert and ignores the wide range of factors that determine whether an individual has the opportunity or resources to change.

Oral health examples of this approach include school-based educational programmes in which school-children are taught about oral health issues within the curriculum (Pine *et al.* 2007).

Empowerment

This aims to assist people in identifying their own concerns and priorities, and in developing the confidence and skill to address these issues. Unlike the other approaches, empowerment is essentially a *bottom-up* approach in which the health professional acts as a facilitator. Rather than being the expert, this role involves helping individuals or communities identify their problems and seek appropriate solutions to move things forward. Skills in negotiation, advocacy, and networking are essential requirements for health professionals working in this way.

This approach can be adopted at both an individual and population level. Within clinical settings, non-directive counselling techniques can be used to

increase people's control over their own lives, although this technique is infrequently used in clinical dentistry. At a population level, community development is a way of empowering groups to become more actively engaged in improving their health and well-being.

Social change

This approach acknowledges the importance of socio-economic and environmental factors in determining health. It therefore aims at changing the physical, social, and economic environments to promote health and well-being. To achieve this requires changes in policy, and political support. Lobbying and policy planning are key elements.

Many health professionals often feel uncomfortable working in such a political arena, but influencing policy-makers at an international, national, or local level is essential to secure good health. For example, in oral health, water fluoridation is largely a political issue that requires political action for its implementation. Only by working closely in a skilful manner with local government and national politicians will progress with this proven public health measure be secured (Evans and Lowry 1999).

Moving upstream

The dominant preventive model adopted by dental professionals across the world remains an individually focused approach that utilizes a combination of clinical preventive measures and behaviour change techniques. As outlined in Discussion Points 2, evidence of the effectiveness of this downstream approach in reducing oral health inequalities is very limited. An urgent need exists for the adoption of an upstream approach that utilizes a broader range of public health measures to tackle the underlying determinants of oral diseases (Watt 2007, 2012).

Figure 8.4 illustrates the range of interventions that can be implemented. Ideally a combination of complementary strategies should be adopted, downstream, mid-stream, and upstream. It is important to recognize that this agenda may appear rather daunting and distant from the realities of clinical practice. However, many of the oral

health strategies outlined in Figure 8.3 can be implemented at a local community level.

Health promotion settings

Recognition of the importance of the wider social environment and modern organizations on health has led many people working in health promotion to adopt a settings approach to their work. This style of working focuses action upon key settings most influential to health through organizational change and development. Table 8.1 presents a range of settings and complementary actions relevant to the promotion of oral health.

DISCUSSION POINTS 6

The frequent consumption of NMES is the principal cause of dental caries. Use the Ottawa Charter as an outline and devise a range of options that could be adopted to reduce NMES consumption.

DISCUSSION POINTS 7

Using the example of oral cancer, provide examples of health promotion action across the settings listed in Table 9.1.

Evidence-based health promotion

Within the health service there is an increasing need to demonstrate that interventions are effective at meeting their set objectives and that they contribute to improved health outcomes. This pressure applies equally to both health promotion and treatment interventions. (Details of evidence-based dentistry are provided in Chapter 7.)

In recent years, several effectiveness reviews have been undertaken to assess the quality and effect of oral health promotion interventions (Brown 1994; Kay and Locker 1996, 1998; Schou and Locker 1994; Sprod *et al.* 1996; Watt and Marinho 2005; Yevlakhova and Satur 2009). In broad terms, they have all adopted a similar review method: a systematic search of the published

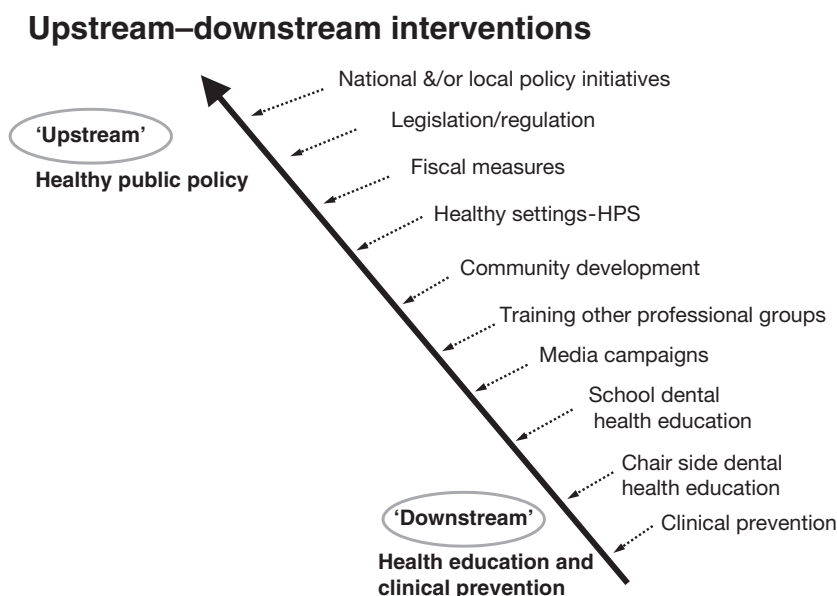


Figure 8.4 Upstream action.

Watt, R.G. (2007). From victim blaming to upstream action: tackling the social determinants of oral health inequalities. *Community Dentistry and Oral Epidemiology* **35**, 1–11.

Table 8.1 Potential settings, target groups, and activities for oral health promotion

Settings				Target group							
Activity	Community	Education	Primary Care	Regional & national projects	Workplace	Pre-school	Young people	Adults	Older people	Disabled groups	Professional groups
Education											
Legislation											
Regulation											
Fiscal											
Organizational change											
Community development											
Reorientation of NHS											

(From Watt *et al.* 1996.)

Box 8.3 Common findings of oral health promotion effectiveness reviews

The design of studies and the method of evaluation

- Many studies were poorly designed, e.g. no control groups used.
- Limited evaluation used in most studies.
- Evaluation measures when used were of limited value, were not comparable, and used inadequate timescales to assess change.
- Very basic data analysis undertaken.
- Limited reference to contemporary theoretical base.

Effectiveness of oral health promotion interventions

- Fluoride remains an effective caries preventive agent.
- An individual's knowledge of oral health can be achieved through oral health promotion, but the long-term impact of this is not clear.
- Information alone does not produce long-term behaviour changes.

- Short-term changes in plaque levels can be achieved through oral health promotion interventions. These changes are not sustained over time.
- Very few well-designed studies have assessed the effectiveness of interventions aiming to reduce sugar consumption.
- In general, cost effectiveness has not been assessed in oral health promotion interventions.
- General awareness can be raised by mass media campaigns, but they are not effective at promoting knowledge and behaviour change.
- There is little evidence for the effectiveness of screening for the early detection of oral cancers.

Watt *et al.* 2001.

and unpublished oral health promotion literature to determine the overall impact of interventions on a range of outcomes. The common findings of these reviews are shown in Box 8.3.

The results from the systematic reviews present a fairly negative and rather disappointing picture. However, it is important to consider the broader context before jumping to conclusions. It is certainly clear that improvements are needed in the design of future interventions to enable a more rigorous assessment of their effect in promoting oral health. Poorly designed studies provide limited insights into what works. In future, oral health promoters, dental professionals, and academics need to work together to design appropriate and robust studies to evaluate preventive interventions. Future interventions also need to be based upon a sound theoretical approach to guide their development, implementation, and evaluation.

In terms of the effectiveness of interventions, it should be noted that the vast majority of the studies reviewed were health education programmes designed to change oral health behaviours largely through the acquisition of new knowledge. It is not a surprise therefore that these type of interventions had limited

long-term effect on oral health. More research is needed on the implementation and evaluation of oral health promotion interventions based upon the principles of the Ottawa Charter.

Principles of evaluation

Evaluation should be a core element in the planning of any health service activity, whether it be a treatment or health promotion activity. Evaluation is the process of assessing what has been achieved and how it has been achieved (Ewles and Simnett 2003). It is therefore a critical appraisal of any activity to assess what were the good and bad features, and ways of improving future activity. Both outcome and process evaluation measures can be assessed.

Outcome evaluation is designed to assess what has been achieved and whether the objectives set have been reached. A whole range of outcome measures can be used in health promotion evaluation, depending upon the nature of the activity undertaken. For example, outcome measures could include assessing changes in health awareness, knowledge or attitude, or policy (Nutbeam 1998). In some circumstances,

changes in health status could be used as an outcome measure for certain health promotion interventions. However, this is only appropriate when the intervention is a long-term programme capable of achieving such a change (Watt *et al.* 2001). A whole range of methods can be used to measure health promotion outcomes. These include questionnaires, interviews, policy reviews, and health surveys, depending on which outcomes are being assessed.

In health promotion, in addition to measuring the outcomes it is important to also assess the processes involved in developing and implementing an intervention. Process evaluation therefore aims to assess the quality and delivery of the implementation. What did the participants think of the intervention? What proportion of the target population did the intervention reach? Were the most appropriate methods and materials used? Was the timescale appropriate? Were resources used efficiently? These are all important process issues that provide valuable information on interventions.

Oral health promotion strategies

Around the world, a range of national oral health strategies have been published in recent years. These documents aim to provide a strategic framework for action to improve oral health in each country (Department of Health 2005; Government of Victoria 2011; US Department of Health and Human Service 2010). National oral health targets have been set and broad recommendations for action outlined. However, the success of national strategies is largely dependent upon the development of effective action at a local level. Often health districts/boards publish a detailed local oral health strategy that translates the national agenda into local action.

Conclusion

Treatment services alone will never successfully alleviate the causes of dental diseases. Health promotion offers the potential to tackle the underlying determinants of oral health and thereby improve the oral

health of all sections in society. It involves a range of different strategies, one of which may include health education. The success of health promotion largely depends upon developing partnerships across agencies and, most importantly, actively involving local people in the whole process of health promotion.

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9 Overview of behaviour change

CHAPTER CONTENTS

Introduction

Background

Theories of change

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Implications for clinical practice and health promotion

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Further reading

By the end of this chapter you should be able to:

- Outline the importance of the concepts of behaviour change to dental practice.
- Describe the main elements and features of a selection of important theories of change.
- Consider the implications of behaviour change theory for supporting patients in changing and maintaining health-promoting behaviours.

This chapter links with:

- Principles of oral health promotion and dental health education (Chapters 8 and 10).
- Prevention in practice: caries, periodontal disease, oral cancer, and trauma (Chapters 11 and 13–16).

Introduction

Many dental practitioners become very frustrated with their patients when they fail to follow advice given to improve their oral health. This failure can often be interpreted by dentists as a sign of disinterest, lack of

motivation, or sometimes even stupidity! Such an approach helps no one. As has already been identified, to successfully promote oral health the dental team need to work with their patients in a number of ways. For example, to help them select a healthy diet, maintain good oral hygiene, or stop smoking, the dental team need to understand what factors influence these behaviours and how they can be altered successfully.

This chapter therefore aims to review behaviour change to help you understand more fully how you as a clinician can help your patients successfully alter their behaviour to promote and maintain their oral health. Theories and models of behaviour change will be reviewed and consideration will also focus on the practical factors influencing the process of change.

Background

Before reviewing the theoretical detail of behaviour change it is important to restate a core principle of public health, that is, the importance of the underlying social determinants of health. A wealth of evidence has highlighted that individual behaviours have a relatively

limited influence on health outcomes compared to economic, environmental, and social factors (Marmot and Wilkinson 2006; Wilkinson 1996). Indeed, oral health behaviours play a somewhat minor role in explaining oral health inequalities (Sabbah *et al.* 2009; Sanders *et al.* 2006). Any exploration of individual behaviour change therefore needs to take into account the influence of the broader factors operating at a macro level. However, for health professionals working with individual patients, helping people change their behaviour is still an important task within their clinical practice.

Traditionally, health professionals have focused largely upon giving their patients information in an attempt to change their behaviour. Such an approach has, however, been mostly unsuccessful at securing long-term changes in behaviour (Sprod *et al.* 1996; Yevahova and Satur 2009).

DISCUSSION POINTS 1

Explain why providing only information to clients may not be successful in changing their behaviour.

Educational theory has identified that there are three domains of learning:

- Cognitive
- Affective
- Behavioural.

The cognitive domain refers to the acquisition of factual knowledge and intellectual understanding of ideas. The affective domain is concerned with attitudes, beliefs, and values, whereas the behavioural refers to skills or actions performed. Traditional dental health education was based upon the theory that acquiring new knowledge would alter attitudes and lead to a change in behaviour, the so-called KAB model.

$$K \Rightarrow A \Rightarrow B$$

This somewhat simplistic representation of human behaviour rarely exists in the real world. In reality a very complex and dynamic relationship operates between the three domains of learning. In addition, as has been highlighted in Chapter 2, behaviour is largely

Box 9.1 Definitions of health behaviour

'Overt behaviour patterns, actions and habits that relate to health maintenance, to health restoration and to health improvement' (Gochman 1982).

'Any activity undertaken by people in order to protect, promote or maintain health and prevent disease' (Steptoe and Wardle 1994).

determined by the opportunities and conditions in which individuals are placed (Sheiham 2000).

Theories of change

An extensive range of models and theories have been proposed to explain behaviour change. Most have been developed by health psychologists who focus at an individual level and largely ignore the social context within which behaviour is enacted. Box 9.1 provides some definitions of health behaviour.

A comprehensive review of behaviour change has highlighted that although a wide range of different theories have been developed; no single theory is able to fully explain the complexities of human behaviour (NICE 2007). This section, however, will describe a selection of the more interesting and innovative theories that provide some helpful insights for health professionals seeking to modify their patients' health behaviours.

To help focus your thoughts before reading the theory behind this topic, it would be helpful to reflect upon your own personal experience of changing a behaviour.

DISCUSSION POINTS 2

Think of an occasion when you have tried to change a certain behaviour, for example eating, smoking, or exercise, and now answer the following questions.

- 1 What exactly did you try to change?
- 2 Why did you want to change?
- 3 What influenced your attempt at a change?
- 4 Describe what happened when you tried to change?
- 5 Were you successful with your desired change?
- 6 What factors made the change more difficult?

Health locus of control (HLOC)

This concept was developed from social-learning theory (Rotter *et al.* 1972) and measures the extent to which individuals believe that their health is influenced either by their own behaviour or by external causes. It is not a measure of actual control of behaviour but rather perceived control. Research indicates that the concept is multi-dimensional (Wallston *et al.* 1978). The first dimension is called *internal HLOC*, which represents a person's belief about the impact of his or her own actions on health outcomes. The other two dimensions refer to external influences on outcomes. *Powerful others HLOC* focuses on beliefs about the influence of important people on outcomes, whereas *chance HLOC* refers to the effect of chance or fate on outcomes.

Examples illustrating this concept, with reference to periodontal disease, are as follows:

1 People with a high internal HLOC would believe that their periodontal health is largely determined by their own ability and skill to effectively remove plaque.

- 2 People with high powerful others HLOC would believe that to maintain their periodontal health, dentists and hygienists are important. These people would therefore believe regular visits to dentists are important for the prevention of periodontal disease.
- 3 People who score high on chance HLOC would be likely to believe that their periodontal health was determined by chance, and that they could do little to influence the disease process.

Health belief model (HBM)

The health belief model (Becker 1974; Rosenstock 1966) is one of the best known models which explores the function of beliefs in decision-making. The model has been extensively used to predict certain health behaviours, but with only limited success in relation to oral health (Søgaard 1993).

Essentially, the HBM proposes that when individuals consider changing their behaviour they engage in a cost/benefit analysis of the situation (Figure 9.1). This would include an assessment of:

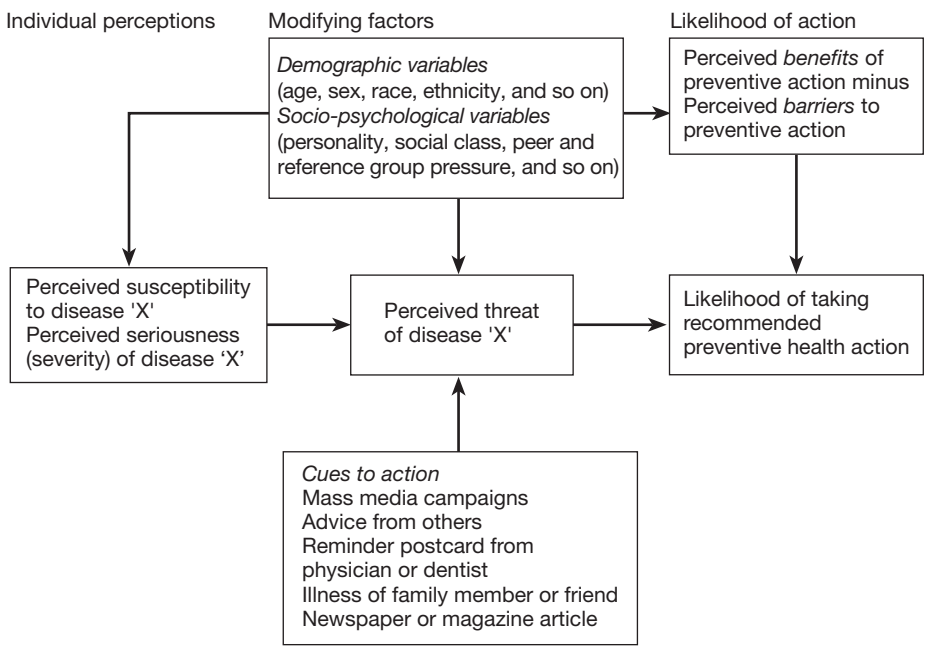


Figure 9.1 The health belief model.
Reproduced with permission from Becker and Maiman (1975). *Medical care*, with permission from Lippincott Williams and Wilkins.

- their susceptibility to the health threat;
- the perceived severity of that threat;
- the perceived value of changing the behaviour in question.

In addition, the HBM suggests that before a change of behaviour takes place there needs to be a cue or trigger to initiate an alteration in behaviour. Cues to action may include a range of events, such as a comment from a trusted friend, a piece of information on the television, or advice from a dentist.

The Theory of Planned Behaviour (TPB) model

The Theory of Planned Behaviour (TPB) model is illustrated in Figure 9.2. In this model it is postulated that a change in behaviour will occur through the transitional phases outlined in the model. Intentions are central to this model in the sense that before change in behaviour occurs, people must have contemplated the change and formed intentions to change. The formation of intentions is influenced by attitudes and beliefs about the behaviour, for example thinking that going to the swimming pool is a pleasant thing to do, and the physical activity is going to improve general fitness levels. Subjective norms

relate to others’ attitudes to the behaviour and the person’s desire to be seen to comply with others. In the example above, the person may think his or her peer group thinks that keeping physically fit is important and he/she wants to please the peer group. Intentions are also determined by perceived behavioural control. This refers to the person believing that he/she can perform the behaviour. In this stage, a person weighs up what he/she knows and needs to do to execute the behaviour against factors such as joining a health club is expensive and takes up valuable time. These variables are in turn influenced by behavioural beliefs (going swimming will improve health), normative beliefs (everyone thinks keeping fit is a behaviour that should be encouraged), and control beliefs (the person holds beliefs that act as a barrier to performing the behaviour). Finally, these variables are influenced by demographics, personality, and environmental variables. While TPB is very comprehensive, it assumes that formation of intentions leads to behaviour change, yet this is not always the case.

Communication of innovation model

This model, developed originally by Rogers and Shoemaker (1971), explores the process of change at a population level. The theory explains how population

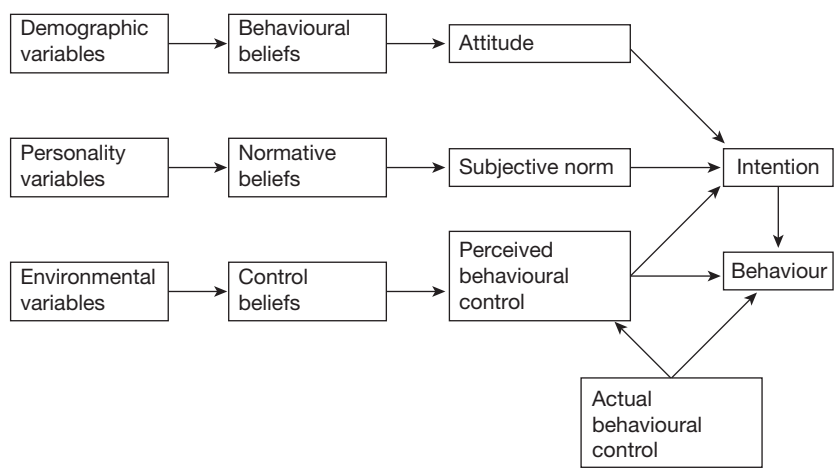


Figure 9.2 The Theory of Planned Behaviour model.
Reproduced from Ajzen I (1985). From intentions to actions: a theory of planned behaviour.
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groups come to change customary practices and adopt new behaviours. The theory is based upon research in anthropology, sociology, education, communication, and marketing theory and can be applied to a variety of target populations, including professional groups.

Different categories of adopters are identified dependent upon individuals' awareness and willingness to try out new practices (Figure 9.3). For example, *innovators* are individuals eager to experiment with new behaviours. They tend to be middle-class people who are adventurous and keen to find out information about new ideas, mostly from the media. They are closely followed by *early adopters*, who tend to be respected members of society. In turn, they are succeeded by the *early majority*, who adopt new ideas deliberately just ahead of Mr/Ms Average. These first three groups all make the decision to change based upon a reasoned analysis of the costs and benefits of an innovation. The penultimate group are the *late majority*, who are usually lower in social standing and learn new ideas from peers through established social networks. *Laggards*, the last group to adopt an innovation, tend to be socially isolated and unresponsive to new ideas and social pressures. When the proportion of those who adopt the innovation is plotted against time, a characteristic S-shaped curve results.

Although developed over 25 years ago, this theory clearly still has direct relevance to health promotion

practice. For example, the processes of adoption of change within populations could help in the development of interventions designed to tackle health inequalities through targeting defined subgroups. The influence of certain sections of the middle-class as early adopters should not be overlooked; they can be very valuable as opinion leaders and agents of change within the wider society.

Stages of change model

This model was developed by a US research team originally investigating the processes involved in smoking cessation (Prochaska and DiClemente 1983). The model has since been revised and applied to a whole range of health-related behaviours, including diet change, exercise, and drug use.

The model is based on the assumption that behaviour change is a dynamic, non-linear process that involves several distinct stages (Figure 9.4). At the *precontemplation* stage, an individual has not even considered changing his or her behaviour, whereas in *contemplation* a person is thinking over the pros and cons of making a change. *Decision* is the stage when a person is making definite plans to change, in *active changes* the actual behaviour change is initiated, and in *maintenance* the modified behaviour is actively sustained. The model recognizes that, for many people, changing behaviour is a difficult and prolonged process that may involve many attempts, as *relapses*

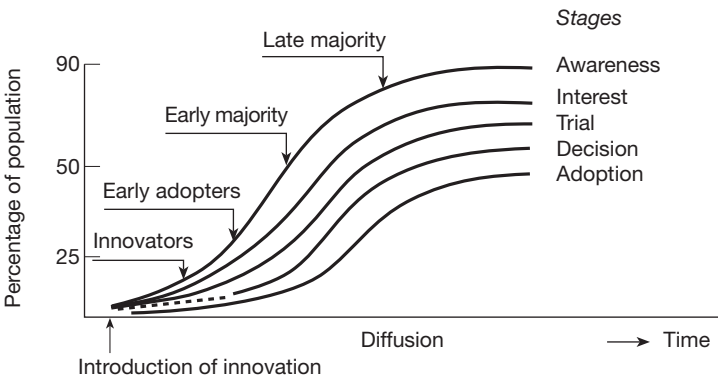


Figure 9.3 Diffusion of innovation. Reproduced with permission from Becker and Maiman (1975). *Medical care*, with permission from Lippincott Williams and Wilkins.

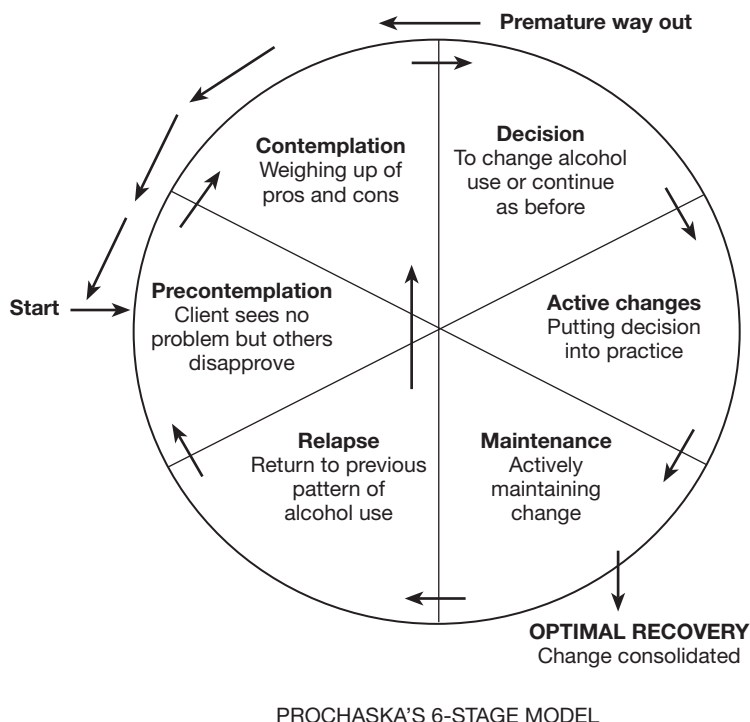


Figure 9.4 Stages of change model.

Reproduced from Prochaska J and DiClemente C (1984). *The Transtheoretical Approach: Crossing Traditional Boundaries of Therapy*. Krieger.

often occur in the process. Marlatt and Gordon (1980) have identified that these relapses are most often caused by:

- negative emotional states
- interpersonal conflict
- social pressures.

Although this model has been criticized as an over-simplistic representation of change, it does provide insights into the processes involved when an individual changes certain behaviours. Of particular importance is the need to target varied interventions to people who are at the different stages of change and not to assume everyone is ready or willing to change (Campbell *et al.* 1994). It is also important to recognize the routine nature of relapsing, and the need for health professionals to provide support and encouragement at this crucial point in the process.

DISCUSSION POINTS 3

The stages of change model identifies different points in the process of change.

Identify how dental professionals could help their patients successfully modify their tooth-brushing behaviour. Consider what could be done at each stage in the model.

Sense of coherence (SOC)

This theory adopts a very different approach. Based upon the concept of salutogenesis, the origins or cause of health, this approach seeks to explain how people maintain good health (Antonovsky 1987). Most other theories explore the reasons and pathways to disease and pathogenesis; this salutogenic approach considers a radically different question, the causes of positive health and well-being. Sense of coherence

(SOC) consists of three key components: comprehensibility, manageability, and meaningfulness (Antonovsky 1987). The first component, comprehensibility, refers to the extent to which a person perceives the stimuli that is presented to him or her as making sense, as clear and consistent; in other words, they can make sense of it. The next component, manageability, refers to the extent to which a person perceives that he/she has adequate resources to meet the demands posed by the stimuli. These resources may include the individual's own sense of control and the support and assistance from others. The third component, meaningfulness, refers to the extent to which a person feels that life makes sense emotionally and that he/she is prepared and committed to dealing with life's challenges and demands. Antonovsky (1987) summarizes the concept as:

a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (i) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (ii) the resources are available to one to meet the demands posed by these stimuli; and (iii) these demands are challenges, worthy of investment and engagement.

A range of oral health studies in different countries have used SOC as a theoretical approach in explaining oral health outcomes and inequalities (Ayo-Yusuf *et al.* 2008; Bernabe *et al.* 2010; Savolainen *et al.* 2005). More recently, the approach has been used to inform the development of school-based oral health promotion interventions (Nammontri *et al.* 2012).

Social epidemiology frameworks

Life course approach

This theory is based upon an analysis of the complex ways in which biological risk interacts with economic, social, and psychological factors in the development of

chronic disease throughout the entire course of life, from early life to old age and death (Kuh and Ben-Shlomo 2004). For example, epidemiological evidence from longitudinal studies that have closely monitored the health and development of groups of people, beginning at birth and continuing throughout adulthood, have demonstrated the long-term effects of low birth weight. When very small babies reach adulthood, they have a far greater chance of experiencing a range of chronic conditions such as heart disease (Barker 1994).

Various theoretical explanations have been proposed on the mechanisms by which early life circumstances affect later health and disease outcomes in adulthood and older age (Kuh and Ben Shlomo 2004). One theory proposes that there are critical periods in life when individuals are particularly vulnerable to adverse circumstances (Box 9.2). For example, changing schools, entry into the job market, and becoming a parent are all significant periods in life that can have an impact on later health (Bartley *et al.* 1997). Another explanation is termed the accumulation of risk model which suggests that adverse events accumulate incrementally through the life course and these initiate episodes of illness and alter behaviours which subsequently increase the risk of chronic disease in later life.

A growing body of epidemiological evidence from population longitudinal studies from around the world has highlighted the impact of disturbed early growth and development, childhood infection, poor nutrition,

Box 9.2 Critical periods in human development most relevant to health

- 1 Transition from primary to secondary school.
- 2 School examinations.
- 3 Entry to labour market.
- 4 Leaving parental home.
- 5 Establishing own residence.
- 6 Transition to parenthood.
- 7 Job insecurity, change, or loss.
- 8 Exit from labour market.

(Bartley *et al.* 1997.)

and social and psychological disadvantage across the life course on a range of important chronic diseases. Do early life factors affect oral diseases in adulthood? Although more limited evidence exists in relation to oral health as many of the large cohort studies have not collected detailed data on oral health, studies in New Zealand and Brazil where clinical data have been collected have demonstrated the significant impact of adverse early life conditions on later oral health outcomes (Nicolau *et al.* 2007).

Social capital

In recent years, a growing body of research has highlighted the importance of social capital and social relationships on morbidity and mortality. Social capital is a complex entity that encompasses a range of different measures of social relationships. There is not a simple consensus definition of what is meant by social capital, but a useful definition is 'features of social organization, such as civic participation, norms of reciprocity, and trust in others, that facilitate co-operation for mutual benefit' (Putnam 1993). In public health research, two key dimensions of social capital are described: structural and cognitive domains (Islam *et al.* 2006). The structural dimension includes observable aspects of social organization and is characterized by nature and density of social networks and civic engagement such as membership of community organizations. The cognitive dimension reflects subjective attitudes such as trust in others and norms of reciprocity.

A leading research group from the Harvard School of Public Health have published results from a study in which data from the US General Social Survey were assessed to measure the relationship between measures of social capital, income inequality, and mortality in 39 states across the USA (Kawachi *et al.* 1997). The results indicated that income inequality was strongly associated with lack of social trust and that states with high levels of social mistrust had higher age-adjusted mortality rates from a range of conditions, including coronary heart disease, malignant neoplasms, cerebrovascular disease, unintentional injury, and infant mortality.

The relationship between oral health and social capital has also been explored in a variety of countries such as Japan, Brazil, Sweden, and the UK, and demonstrated an association with a range of oral health outcomes (Aida *et al.* 2009; Avlund *et al.* 2003; Pattussi *et al.* 2001, 2006).

Kawachi and colleagues (1997) concluded that 'the growing gap between the rich and the poor affects the social organization of communities and that the resulting damage to the social fabric may have profound implications for the public's health.'

The implications for public health of the theory of social capital and social cohesion are potentially profound. What role do health workers have in facilitating improved social networks, social support, and community involvement? Community development approaches within health promotion clearly fit very well into this agenda.

Practical reflections on theories of behaviour change

The theoretical research into behaviour change reviewed above may appear very abstract and detached from the realities of clinical dental practice. However, there are certain important issues of relevance that should be highlighted. This is best achieved by reflecting back upon personal experiences of behaviour change. In Discussion Points 2, a series of questions was posed to encourage you to consider your own experience. Think back to your responses to these questions and consider the ideas presented in the theoretical overview.

Process of change

Very rarely do individuals manage to change an established behaviour at one attempt. For most people several attempts are required before they can successfully change a habit. This process may take several months, or even years, and for many people can be seen as a constant battle. A whole host of factors, many of which may be outside the control of the individual, influence progress with desired change.

Motivations to change

When you reviewed your experiences of changing a behaviour, it may have become very apparent that the initial motivation for changing was not primarily health reasons. Clinicians often forget that for most ordinary people, teeth and gums are not the single most important issue in their complex lives. Individuals often reduce their sugars intake not due to concerns about their caries risk but because of worries about their weight or body shape (Watt 1997). Even with something as potentially damaging to the health as smoking, people's motivations to quit are often far more complex and diverse. It is therefore important to recognize the varying motivations individuals may have for changing their behaviours. Health-directed behaviour change may be important for people who are especially concerned about their health. For many, however, social, financial, and other practical concerns may be of paramount importance in their motivations to change, with health issues, so-called health-related behaviour change, being of secondary concern.

DISCUSSION POINTS 4

Research into smoking cessation has identified a range of reported reasons for quitting.

List potential reasons for quitting smoking.

Classify these factors into either health-related or health-directed factors.

Glanz *et al.* (2008) makes a distinction between a motivational stage (an intention to act) and a volitional stage (here concrete plans are made and detailed action is initiated. Renz and Newton (2009) suggest that using different approaches at different stages would favour the likelihood of behaviour change. In a motivational intervention, for example, the dental team might stress the benefits and self-efficacy beliefs around oral hygiene behaviours. In contrast, a volitional intervention would emphasize planning '*the when, where and how of behaviour change*' (Renz and Newton 2009, p. 265).

Barriers preventing change

Most of us, no matter how determined we may be to change, often do not succeed with our attempt. This is principally due to the many barriers (listed in Box 9.3) that prevent us from achieving long-term sustained changes.

Clustering of behaviours

Often groups of behaviours such as smoking, alcohol misuse, and poor hygiene habits cluster together in patterns and amongst particular groups of people. Altering one behaviour that is linked to another set of behaviours may therefore prove problematic unless

Box 9.3 Barriers to achieving long-term change

- Lack of opportunity—for example, limited access to healthier snacks in school tuck shops.
- Lack of resources—for example, unable to afford new toothbrushes for large family.
- Lack of support—for example, living with a smoker when you want to quit.
- Conflicting information on nature of change—for example, confusion over health education messages.
- Conflicting motives—for example, enjoyment associated with eating sugary snacks with friends.
- Long-term nature of benefit—for example, lung cancer does not affect teenagers for another 40 years and smoking has immediate personal and social benefits.
- Belief that change is not possible—for example, when someone has tried to improve his or her tooth-brushing technique before without success.
- No clearly defined goals—for example, asking someone to stop eating sugar altogether when so many processed foods have sugars added to them.
- Lack of knowledge on what to change—for example, people's beliefs that fruit juices are full of vitamins so they must be good for their baby.

(Jacob and Plamping 1989.)

careful thought is given to the underlying influences on these clusters of behaviours.

Implications for clinical practice and health promotion

Key implications of behaviour change

What implications can be drawn from this exploration of behaviour change? Well, there are several fundamental lessons that can be highlighted.

Importance of context and environment

Individual behaviours are largely determined by a complex array of factors beyond the control of most individuals. 'Victim blaming' helps no one, least of all individuals with the greatest oral health needs.

Limitations of information alone

Leaflets, posters, videos, and websites that concentrate on imparting oral health knowledge will only be of limited value to most people. Behaviour change is complex and most people are well informed about the basic oral health messages.

Process of change

Most people will have extensive experience of attempting to change their eating patterns or quitting smoking, the so-called health career. It is essential to take a detailed history of a person's previous experiences of change and learn from this. Target interventions to match individuals' desire and abilities to change.

Support essential

If you have struggled to change elements of your behaviour, be understanding and supportive with others in your clinical environment. Encouragement, understanding, and empathy are all essential to enable your clients to achieve their goals.

Conclusion

This chapter has introduced some of the key theory and practical issues relevant to understanding behaviour change. To be a successful clinician you will need to be able to influence your clients and assist them with desired changes. Success in helping clients to alter their behaviours will largely depend upon your awareness of the factors and processes influencing behaviour change. The provision of information alone in most cases will be insufficient to achieve sustained changes in behaviour to promote oral health.

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10 Prevention and oral health education in dental practice settings

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Further reading

By the end of this chapter you should be able to:

- Outline the importance and relevance of prevention in dental practice.
- Describe the key oral health preventive messages.
- Outline effective ways of supporting patients in changing their behaviours to promote and maintain good oral health.
- Present an overview of the different methods and materials used in prevention and health education.

This chapter links with:

- Principles of oral health promotion (Chapter 8).
- Overview of behaviour change (Chapter 9).
- Prevention of caries, periodontal disease, oral cancer, and dental trauma (Chapters 11 and 13–15).

Introduction

Prevention is a core element of the practice of dentistry in the 21st century. Of course the provision of evidence-based dental treatment and surgical intervention are the main clinical roles for dentists, but, as health professionals, prevention is also a key responsibility (Department of Health 2012; Petersen 2009; Steele *et al.* 2009). Adopting a preventive orientation is relevant to all aspects of clinical care, from diagnosis and treatment planning to referral and monitoring procedures. Dentists and their team members have an important role in helping their patients prevent, control, and manage their oral health. Prevention is important for all patients, but support needs to be tailored to the needs and circumstances of each individual. It is also essential that any preventive advice and support is informed

by scientific evidence to ensure maximum benefit is gained. Effectiveness reviews of preventive interventions have shown that many are ineffective and may increase oral health inequalities unless they are supported by broader health promotion interventions (Watt and Marinho 2005; Yehavloa and Satur 2009). Prevention in clinical settings therefore needs to be part of a more comprehensive oral health promotion strategy that addresses the underlying causes of dental disease through public health action, as well as helping patients and their families prevent oral diseases and maintain good oral health through self-care practices.

Definition of health education

Health education is defined as any educational activity that aims to achieve a health-related goal (WHO 1984). Activity can be directed at individuals, groups, or even populations. There are three main domains of learning (see also Chapter 9):

- **Cognitive:** understanding factual knowledge (for example, knowledge that eating sugary snacks is linked to the development of dental decay).
- **Affective:** emotions, feelings, and beliefs associated with health (for example, belief that baby teeth are not important).
- **Behavioural:** skills development (for example, skills required to effectively floss teeth).

DISCUSSION POINTS 1

Traditionally, health education was confined to schools and concentrated largely on increasing students' knowledge of various health issues.

What are the limitations of this approach?

Why was this the dominant approach in health education for so long?

What alternative approach for oral health education would you recommend?

How do knowledge, attitudes, and behaviours relate to each other? For most people, in most instances, the relationship is complex, dynamic, and very personal;

very rarely is it linear. In other words, human-beings are not purely rational in their thoughts, feelings, and actions. For example, the vast majority of smokers are fully aware that smoking is a major risk factor for lung cancers and a whole host of other conditions. This knowledge, however, does not stop them smoking. When knowledge conflicts with behaviour, it is known as cognitive dissonance. Many smokers believe the habit is dirty and socially unattractive, but such attitudes do not stop people from smoking.

In the section **Health education and methods**, the different methods that can be used to address the domains of learning will be explored. With such a complex and dynamic relationship existing between knowledge, attitudes, and behaviour, it is essential that all three elements are appropriately covered in preventive support and health education.

Chapter 8 outlined that health education is one of the strategies within a health promotion policy. Health education and health promotion are therefore not the same thing, and the two terms should be used carefully, as appropriate.

Core oral health preventive messages

At the most fundamental level, it is essential that preventive messages delivered to the public are scientifically sound, consistent, and clear. In Chapters 11 (caries), 13 (periodontal diseases), 14 (oral cancers, and 15 (dental trauma), details are given on the aetiology of each condition and the preventive approach needed to tackle the respective disease. Box 10.1 outlines the most important core preventive messages to promote and maintain good oral health. A more detailed and comprehensive account of the preventive messages and their supporting evidence is covered in *Delivering Better Oral Health—An Evidence Based Toolkit for Prevention* (Department of Health 2012). This resource has been distributed to all dental practitioners working in England to support the provision of a more evidence-based approach to clinical preventive care. Further details of this resource are outlined in **Resources for prevention**.

Box 10.1 Oral health preventive messages

- Sugar-containing foods and drinks should be limited to mealtimes and on no more than four occasions in the day.
- Brush the teeth effectively twice per day, preferably last thing at night and on one other occasion. Use a small-headed brush and change when the bristles appear worn. Powered toothbrushes with an oscillating/rotating head are also effective.
- Use a family-strength fluoridated toothpaste with 1,350 ppm fluoride or above (for children under 3 years of age use fluoridated toothpastes containing 1,000 ppm fluoride).
- Spit do not rinse after brushing.
- Do not smoke.
- Drink alcohol in moderation and be aware of your units of consumption.
- Visit the dentist regularly.

Although these preventive oral health messages may appear relatively simple, in reality they address a complex and varied set of circumstances. Also each message has considerable detail behind it, which can differ for different stages in the life course. For example, dietary messages for pre-school children may be quite different from those for adults and older people. It is essential that oral health messages are consistent, as the general public are becoming increasingly skeptical of health information, particularly when experts appear not to agree with each other. Chapter 9 provides an overview of the principles of behaviour change. The next section will consider the best ways of supporting patients in following preventive messages.

Implementing preventive messages: achieving change

At the most basic level, to be effective preventive advice requires patients to change their behaviour in line with professional guidance. This can be termed patient adherence and is defined as ‘the extent to which a person’s behaviour—taking medication, following a diet, and/or executing lifestyle changes—corresponds with agreed recommendations from a health care provider’ (Sabaté 2003). Based upon the principles of health education planning, patient adherence can be maximized in the following manner.

Understand your patients and their needs

The provision of preventive advice is not a discrete and separate issue but one that is incorporated into all aspects of patient care and treatment. Information from patients’ medical, social and family histories are all highly relevant to understanding how best to help them change their behaviour to improve their oral health. Rather than solely imposing a professionally determined ‘diagnosis’ of what needs to be changed, it is important to understand the patient’s circumstances and needs. Do not assume every patient has the desire, ability, and support to change his or her behaviours.

Tailor advice and support

Every patient is different and any advice and support offered to them must be tailored to their circumstances and characteristics. It is also important to consider the timing of when to offer advice and support. At periods of major stress and pressure, patients are much less likely to have the motivation, interest, and ability to change their behaviour.

Not all behaviours are the same. For example, dietary behaviour and oral hygiene practices are very different behaviours in terms of their influences, motivations, and processes. Understanding patients’ motivation for change can be important to help and support them. Do not assume everyone is solely focused on changing behaviours to avoid diseases. Other motivations such as

improving appearance and social confidence, saving money, and feeling in control of one's life are strong motivations for changing behaviour for many people.

Communicate well

A range of communication skills should be used in supporting patients to change behaviours. Active listening, the use of open questions, and an encouraging tone will all help patients reflect and explore their experiences. It is also important not to rush these discussions as people need time to reflect and explain themselves. Care must also be taken in the tone and style of communication. The use of threatening, patronizing, or prescriptive approaches should be avoided as these do more harm than good.

Review benefit of changing and past experiences

A key element in supporting patients is to increase their own self-confidence to change. Exploring the personal benefits of changing a particular behaviour can help a person to become more motivated and enthusiastic to change. Most people will have experience of attempting to change behaviours, so it is important to review what has happened in the past to identify what helped or hindered them previously. Learning from past experiences can again help to increase people's self-confidence and insight.

Formulate SMART objectives

Once a person has decided that he/she wants to change, it is important to negotiate and agree with the patient a clearly defined objective or goal (Jacob and Plamping 1989).

Objectives should be SMART:

Specific—clear and precise goals provide focus and clarity of purpose.

Measurable—setting goals that can be easily measured and quantified is important.

Achievable—set goals that are challenging but within the patient's reach. Setting unachievable goals merely demotivates people.

Relevant—it is essential that the goal is considered relevant to the patient's circumstances, motivations, and needs.

Timely—it is important to check that the goal is the right thing for the patient to achieve right now. Setting a clear time frame is also important to help maintain motivation and to monitor progress.

Plan ahead for success

Once SMART goals have been agreed, it is then possible to develop an individualized action plan mapping out the practical steps needed to achieve the goals agreed. Identifying suitable and appropriate rewards for any progress achieved is an important part of the planning process and helps maintain motivation.

Once a person has made an initial change, that is not the end of the matter. Maintaining the new behaviour is critically important, as many people lapse back to the old pattern of behaviour when they encounter difficult situations. An important way of avoiding lapses is to identify appropriate support networks that can help the person maintain and stabilize the new behaviour. Friends, colleagues, and family members can all provide encouragement and support if they understand what the person is going through. It is also useful to help the person predict potentially difficult situations ahead and to develop their own coping mechanisms. For example, at times of particular stress and pressure, people may need to identify how they will cope to avoid relapse.

Monitor and review

As outlined in Chapter 9, behaviour change is rarely a linear one-off discrete event. For most people, for most of the time, changing behaviour is a process that may require several attempts over a period of months, and often years. Dental professionals therefore need to be able to monitor and review patients' experience of changing their behaviour. Indeed, dental teams are in a unique position as they often see their patients on a regular basis every 6–18 months. This provides a good opportunity to assess and review progress. For example, routinely asking patients about their smoking habits and

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recording this information in their clinical notes is a useful means of monitoring smoking cessation outcomes.

Signposting for extra help

Where the circumstances or needs are particularly challenging, it may be necessary to refer the person for more specialized help and support. In these circumstances it is essential that a referral is made to the appropriate local organization. For example, a dental patient who is a very heavy and dependent drinker should be referred to an alcohol support service that is able to provide more specialized support and advice.

Resources for prevention

One of the barriers to providing prevention in clinical settings has been the lack of suitable resources and confusion over the messages that should be delivered to the public. To address this problem, preventive resources for dental teams have been produced in a variety of countries including Australia, Scotland, and England (Department of Health 2012; Government of Victoria 2011; Macpherson *et al.* 2010).

The Department of Health in England has published a comprehensive prevention toolkit for general dental practitioners called *Delivering Better Oral Health* (Department of Health 2012). Based upon current scientific evidence, the toolkit is designed to practically guide dental teams in all areas of preventive practice. The resource is divided into key sections covering:

- Principles of toothbrushing for oral health
- Increasing fluoride availability

Box 10.2 Oral health education methods

- One-to-one supervision
- Group work
- Interactive computer software
- Lectures
- Peer education
- Group discussion
- Role play
- Mass media

- Healthy eating advice
- Identifying sugar-free medicines
- Improving periodontal health
- Stop smoking guidance
- Accessing alcohol misuse support
- Prevention of erosion
- Supporting references.

Health education methods and materials

In addition to providing preventive advice in a clinical setting, a wide variety of health education methods can be used, with the final selection depending upon the aim of the intervention and the most appropriate means of meeting it. Box 10.2 provides an example of the methods that could be used in the promotion of oral health.

A vast array of oral health education materials are produced each year by a wide selection of both commercial and health organizations. Box 10.3 lists a range of different types of health education materials. Each of these resources has certain advantages and disadvantages depending on how they are used.

It is essential that the best quality and most appropriate materials are used in clinical settings. Box 10.4 presents a set of criteria that can be used to assess the quality of materials and therefore facilitate the selection of the best.

Box 10.3 Health education materials

- Computer programmes
- Information sheets
- Flipcharts
- Black/whiteboards
- Leaflets
- Posters
- Display boards
- CDs and DVDs
- Audio cassettes
- Overhead projector transparencies

Box 10.4 Quality criteria to assess health education materials

- Funding source: conflicts of interest?
- Process of development: indications of collaborative working?
- Objectives: implied or stated?
- Target audience: is this clearly stated?
- Scientific content: sources of evidence cited?
- Presentation quality: professional presentation; use of appropriate images, layout, and style of text?
- Appeal: interesting feel, stimulating, engaging?
- Equal opportunities: consideration given to population diversity?
- Understandability: use of jargon, chunks of dense text, plain language?
- Practical focus: application of content?

DISCUSSION POINTS 2

Critically apply the criteria in Box 10.4 to a selection of health education leaflets. What are the main strengths and weaknesses of the materials you have reviewed?

DISCUSSION POINTS 3

Smoking cessation is an expanding area of health education within many primary care settings. Within the setting of a dental practice, outline the key roles and responsibilities of the different members of the dental team in smoking cessation.

Team approach to prevention

To be effective within clinical dental settings, prevention needs to be incorporated within the workload of the whole dental team (Sheiham 1992). However, each team member needs to have a clearly defined role and understand the respective responsibilities of colleagues. Developing prevention within dental practices can therefore act as a useful team-building exercise.

As the leader and manager of the dental team it is essential that the dentist directs and supports any prevention and health education activity. In conjunction with their clinical role, dentists should be involved in assessing their clients' health preventive and education needs, and where appropriate providing opportunistic advice and support. When more intensive health education support is required, dentists should then be able to refer these individuals to other members of the team who have the time, resources, and skills required. In addition to these diagnostic and referral functions, dentists should also perform a coordinating role, overseeing the evaluation and monitoring of health education activity within their practices.

Auxiliary staff involved in health education, such as dental nurses and hygienists, need to have the appropriate training in health education to successfully perform their tasks.

DISCUSSION POINTS 4

Within a dental surgery the staff are planning a health education programme targeted at reducing the sugars consumption of their patients under 5 years old. Suggest what would be some suitable outcome and process evaluation measures for such an intervention.

Skills in oral health education

Just as learning how to cut a cavity correctly involves the acquisition of a range of technical and scientific skills, delivering effective health education requires a wide range of skills that take time, practice, and experience to fully develop. Some of these key skills are listed in Box 10.5.

Settings for oral health education

Oral health education can take place in a wide variety of settings, as shown in Box 10.6. A gradual shift is taking place away from the traditional schools-based activity to a broader-based approach that targets

Box 10.5 Health education skills

- Communication skills
 - Appropriate questioning
 - **Active listening**
 - Summarizing information
 - Giving feedback
- Assessing needs
- Motivational interviewing
- Presentational skills
- Goal-setting
- Teaching skills
- Working with small groups
- Measuring and monitoring change

Box 10.7 Potential partners in oral health education

- General practitioners
- Health visitors
- School nurses
- Pharmacists
- Teachers
- School governors
- Pre-school carers
- Local authority staff
- Politicians—local and national government
- Voluntary sector workers
- Media
- Business and commercial people
- Lecturers—FE colleges

action at influential decision-makers rather than attempting to educate every school child in an area (upstream approach). This form of health education attempts to focus action on key individuals or organizations who then can cascade the health education advice to a wider audience. Not only is this approach more likely to achieve sustained changes but also it is a far more cost-effective way of working.

There are many different important partners to work with in oral health education (Box 10.7). Dentists and their teams working within the General Dental Services may have established links with colleagues in other primary care professions, such as GPs, health visitors, and pharmacists. However, there are many groups outside of the health service who may also have an important role in oral health education. The

community dental services and/or health promotion departments should have links with these groups.

Conclusion

Prevention and oral health education is an important part of oral health promotion and should be an important element of all dental professionals' clinical duties. Effective oral health education within dental practices is largely dependent upon detailed planning and team work. It is important that all preventive and health education advice and support is based upon scientifically sound evidence.

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Box 10.6 Settings for oral health education

- Primary care
- Hospitals and clinics
- Schools and colleges
- Pre-school education and care
- Local authority services
- Commercial organizations
- Workplace
- Community-based initiatives
- Older people's residential homes

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Further reading

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11 Sugars and caries prevention

CHAPTER CONTENTS

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Caries process

Sugars classification

NMES consumption patterns within the population

Evidence on sugars and caries

Evidence on sugars and general health

Recommendations on diet and caries

Dietary counselling in the dental practice

Community-wide initiatives

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Further reading

By the end of this chapter you should be able to:

- Present a classification of sugars based upon government recommendations.
- Critically outline the principal sources of evidence on the relationship between sugars consumption and caries development.
- Describe ways of assisting individuals reduce their sugars consumption.
- Outline approaches to reduce sugars consumption at a population level.

This chapter links with:

- Determinants of health (Chapter 2).
- Trends in oral health (Chapter 6).
- Principles of oral health promotion (Chapter 8).
- Overview of behaviour change (Chapter 9).
- Oral health education in dental practice settings (Chapter 10).

Introduction

Dental caries remains the single most important oral condition treated by the dental profession on a daily basis. From a public health perspective, the prevention of caries is still therefore a major challenge. As outlined in Chapter 4, before effective prevention can be delivered the cause of the condition needs to be fully understood. In addition, the disease process should be clear. This chapter will review the evidence on the aetiology of dental caries and present an overview of preventive measures that can be adopted at an individual clinical level, as well as community wide.

Caries process

Dental caries occurs because of demineralization of enamel and dentine structure by organic acids formed by oral bacteria present in dental plaque through the anaerobic metabolism of dietary sugars. The caries

process is influenced by the susceptibility of the tooth surface, the bacterial profile, the quantity and quality of saliva, and the presence of fluoride which promotes remineralization and inhibits the demineralization of the tooth structure.

Caries is a dynamic process involving alternating periods of demineralization and remineralization. However, the majority of lesions in permanent teeth advance relatively slowly, with an average lesion taking at least 3 years to progress through enamel to dentine (Mejare *et al.* 1998). In populations with low DMF/dmf levels, the majority of carious lesions are confined to the occlusal surfaces of the molar teeth. At higher DMF/dmf levels, smooth surfaces may also be affected by caries (Sheiham and Sabbah 2010).

DISCUSSION POINTS 1

Based upon your dental sciences and clinical teaching:

- Describe the key anatomical features of a caries lesion.
- Review the demineralization and remineralization process within a caries lesion.
- Identify the range of factors that may inhibit the demineralization and aid the remineralization process.

Sugars classification

Many different terms have been used to name and classify sugars. This has caused a degree of confusion amongst both the general public and health professionals. In recognition of this, an expert UK government committee—Committee on Medical Aspects of Food Policy (COMA)—has recommended a revised naming system, which has now become the standard classification of sugars in the UK (Department of Health 1989).

DISCUSSION POINTS 2

List all the different terms that have been used to classify and name sugars.

Identify the possible confusions created by the different names used.

The COMA classification is based upon where the sugar molecules are located within the food or drink structure (Figure 11.1). Intrinsic sugars are found inside the cell structure of certain unprocessed foodstuffs, the most important being whole fruits and vegetables (containing mainly fructose, glucose, and sucrose). Extrinsic sugars, by contrast, are located outside the molecules of the foods and drinks. There are two types: milk extrinsic sugars and non-milk extrinsic sugars (NMES). The extrinsic milk sugars include lactose, found in dairy products such as milk and milk products. NMES are found in table sugar, confectionery, soft drinks, biscuits, honey, and fruit juice.

The WHO and many other international organizations use an alternative term, 'free sugars', to classify the sugars responsible for the development of dental caries (WHO 2003).

NMES consumption patterns within the population

In the last 50 years patterns of eating have changed radically across the world. The types of foods and drinks consumed and the ways in which food is eaten have all changed. This has been caused by a wide range of social, economic, and political changes in society and, in particular, the process of globalization and the marketing activities of the international food and drink companies. Globalization has had an enormous impact on sugars consumption across low-, middle-, and high-income countries. In low-income countries, consumption of sugars has steadily increased in recent decades as international food and drink companies develop and expand their global markets (Drewnowski and Popkin 1997). In middle-, and high-income countries, overall levels of sugars consumption has not changed significantly but the pattern of consumption has altered. In the UK, following the cessation of war-time rationing, there was a massive increase in the consumption of sugars in the 1950s (Figure 11.2). Since this peak in total consumption in the 1950s/1960s there has been a gradual reduction in the amount of NMES consumed. However, the pattern of consumption of NMES has changed greatly in the last 30 years. There has

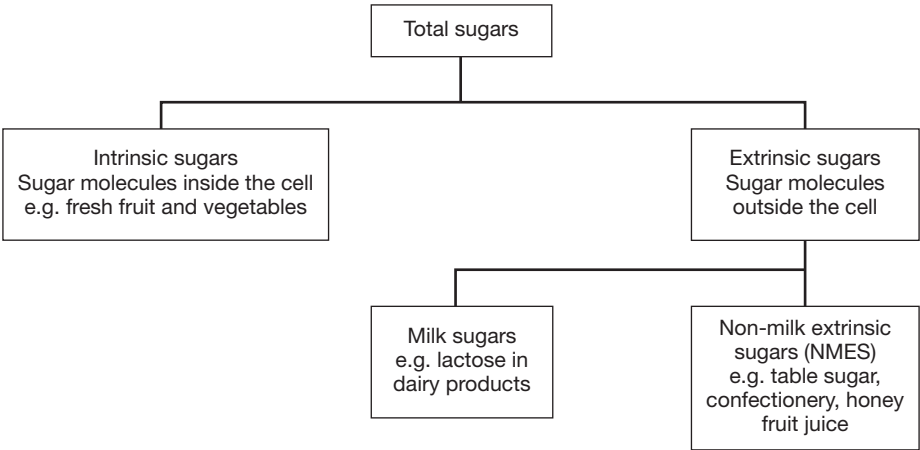


Figure 11.1 Classification of sugar.
Reproduced from Watt 1999 with permission © HMSO.

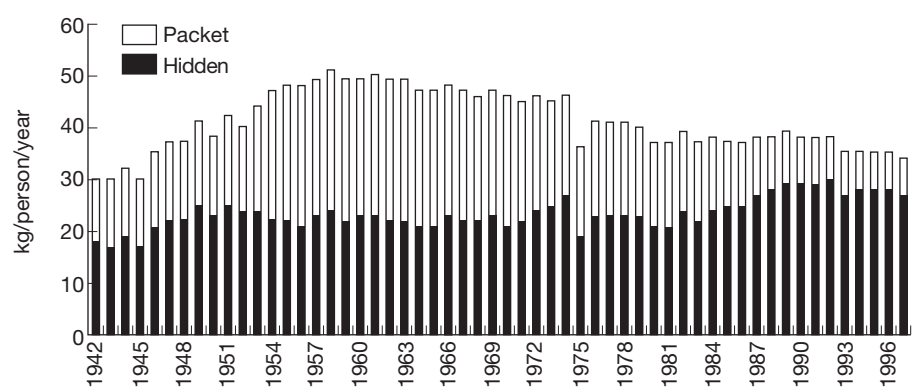


Figure 11.2 Changing patterns of sugar consumption in the UK, 1942–96.
Reproduced from Sustain: The Alliance for Better Food and Farming (2000), *Sweet and Sour-the Impact of Sugar Production and Consumption on People and the Environment*, Sustain, London.

been a large reduction in consumption of table sugar (added to tea/coffee, breakfast cereals, etc.), and instead an increase in NMES contained in processed and manufactured foods and drinks (Sustain 2000). The major sources of NMES in the UK diet are found in soft drinks, confectionery, and biscuits. NMES consumption is highest amongst children and adolescents, and in more deprived populations (Nelson *et al.* 2007).

Table 11.1 lists the NMES content of a range of popular foods and drinks.

The food industry spends large amounts of money each year on the promotion and advertising of sweetened products (Nielsen 1998). Figure 11.3 provides details of advertising budgets on sugary foods and drinks.

Evidence on sugars and caries

The relationship between sugars consumption and caries has been researched extensively for many years, and although the totality of the evidence is clear, the

Table 11.1 NMES content of popular foods and drinks

Food	Serving size	Percentage NMES per serving	Grams of sugar per serving
Kellogg's Frosties	30 g	37	11.1
Kellogg's Coco Pops	30 g	35	10.5
Honey Monster Sugar Puffs	30 g	35	10.5
Coca-Cola	330 ml	10.6	35
Ribena Blackcurrant (bottle)	500 ml	10.5	52.5
Mountain Dew	500 ml	12	60
Mars (standard bar)	58 g	60	34.6
Jaffa Cakes	12 g (1 cake)	52.5	6.4
Custard Cream (supermarket's own brand)	12 g (1 biscuit)	29.8	3.5

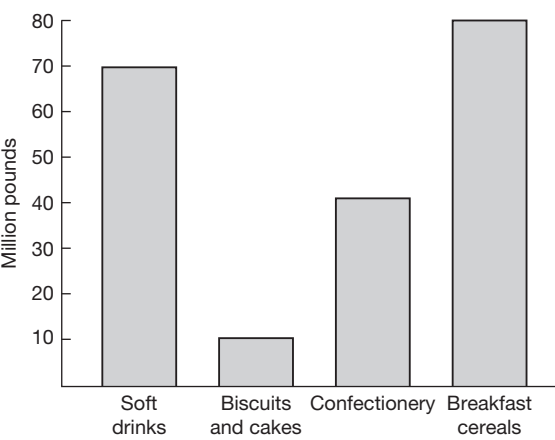


Figure 11.3 Advertising budgets on sugars. Reproduced from Sustain: The Alliance for Better Food and Farming (2000), *Sweet and Sour—the Impact of Sugar Production and Consumption on People and the Environment*. Sustain, London.

topic remains a keenly debated subject amongst certain groups with a vested interest.

The research evidence showing the relationship between sugars consumption and caries is based upon a range of different types of investigation. The WHO, as part of a global strategy to prevent non-communicable diseases, comprehensively reviewed the scientific evidence on sugars intake and caries development (WHO 2003).

DISCUSSION POINTS 3

- In public health it is important to understand the range of perspectives on any given subject.
- In connection to the relationship between sugar and caries, outline the range of groups who are most likely to have a keen interest in this subject.
- Describe the key motivating factors behind these various interest groups.

This excellent report provides an authoritative source on the evidence base on sugars and caries development.

As can be seen from Box 11.1, a great deal of research has been conducted into assessing the relationship between caries and dietary factors. The different types of investigation have particular strengths and weaknesses. In isolation, evidence from only one type of investigation would be insufficient to determine the causation of caries. However, the combined results highlight a consensus view (Department of Health 1989; Moynihan 2005; Sheiham 2001; WHO 2003). This is summarized well by Arens (1998): 'The evidence establishing sugars as an aetiological factor in dental caries is overwhelming. The foundation of this lies in the multiplicity of studies rather than the power of any one.'

Box 11.1 Different types of investigations and studies assessing the relationship between sugars and caries development

Observational human studies

Worldwide epidemiology (Sreebny 1982).
 Native populations, for example Inuit (Zitzow 1979).
 Tristan da Cunha (Fisher 1968).
 Groups eating low amounts of sugar:
 Hopewood House (Harris 1963).
 Hereditary fructose intolerance (Newbrun 1989).
 Dentists' children (Bradford and Crabb 1961).
 War-time diets (Takahashi 1961).
 Groups eating high amounts of sugar:
 Sugar-cane chewers (Frencken 1989).
 Workers in confectionery factories (Anaise 1978).
 Children taking sugar-based medicines (Roberts and Roberts 1979).

Interventional human studies

Vipeholm study (Gustafsson *et al.* 1954).
 Turku study (Scheinin and Makinen 1975).
 Recife study (Rogrigues *et al.* 1999).

Animal experiments

Frequency of feeding (Konig *et al.* 1968).
 Concentration of sugar (Shaw 1979).
 Types of sugar (Grenby *et al.* 1973).

Enamel slab experiments

Lesion formation (Koulourides *et al.* 1976).

Plaque pH experiments

Acidogenicity tests (Imfeld 1977).

Incubation experiments

Test-tube experiments (Grenby *et al.* 1989).
 (Rugg-Gunn 1993.)

DISCUSSION POINTS 4

What type of investigation would provide the best possible source of evidence to establish the relationship between sugars consumption and caries development?

Describe the design of such an investigation.

What are the problems with conducting such an investigation?

In summary, a wealth of evidence, from a multiplicity of sources including human observational and intervention studies, animal experiments, and experimental laboratory studies, has consistently shown that sugars are the most important factor in the development of caries (WHO 2003). Both the frequency of consumption and the total amount of sugars consumed are important in the aetiology of caries. Epidemiological evidence also shows that eating fruits that contain sugars that are naturally incorporated in the cellular structure of the fruit (intrinsic sugars) or lactose in

milk or milk products (milk sugars) have no significant adverse effect on caries development. Population studies also highlight that consuming starch-rich staple foods without the addition of sugars plays a minimal risk to caries.

It is important to also highlight the scientific evidence on breastfeeding and caries. Despite exceptional cases that occasionally present in dental schools, the epidemiological evidence is clear: breastfeeding is not a major cause of caries (Valaitis *et al.* 2000; WHO 2003).

Evidence on sugars and general health

An increasing body of international scientific evidence from experimental, epidemiological, and intervention studies highlights the role that sugars consumption plays in the development of other chronic conditions and, in particular, weight gain and obesity (WHO 2003). Evidence from systematic reviews and meta-analysis of

prospective studies shows, in particular, a clear and consistent association between sugary drinks consumption and obesity and related cardiometabolic diseases (Malik *et al.* 2009; Vartanian *et al.* 2007). Reducing sugars consumption is therefore not only important for preventing dental caries but also now a public health priority.

Recommendations on diet and caries

Based upon the available evidence, the following consensus national and international recommendations have been proposed (Department of Health 1989; WHO 2003):

- The frequency and amount of NMES should be reduced. NMES consumption should be restricted to mealtimes when possible.
- Intakes of foods and/or drinks containing NMES should be limited to a maximum of four times per day.
- NMES should provide no more than 10% of total energy in the diet or less than 60 g per person per day.
- Consumption of intrinsic sugars and starchy foods should be increased (5 pieces/portions of fruit/vegetable per day).

It is important to recognize that although plaque has an important role to play in the caries process, there is insufficient evidence that plaque removal alone will reduce caries (Sutcliffe 1996). Toothbrushing and professional cleaning are not capable of removing all the cariogenic micro-organisms from the dentition. Toothbrushing alone will not prevent caries. Using a fluoride toothpaste will, however, have a significant impact on the caries process.

Dietary counselling in the dental practice

As outlined in Chapter 9, helping patients to change their behaviour is not a simple task—changing what people eat and drink is a particular challenge. In

addition, from a public health perspective it is acknowledged that individualized health education will never tackle the underlying causes of disease in society and is often therefore of limited effectiveness in the absence of more upstream action. However, dentists and their teams have a professional responsibility to help and support those of their patients who want and need to change their eating patterns (Moynihan 2002; Watt *et al.* 2003). Effective dietary counselling should be developed from evidence-based guidelines, as outlined in Box 11.2 (Roe *et al.* 1997). Advice to reduce sugars should essentially follow six key steps as described in Box 11.2. It is particularly important to assess the overall pattern of eating to establish the following information:

- the number of intakes of food and drinks per day;
- the number of intakes that contain NMES and how many were consumed as snacks between mealtimes;
- whether any intakes of NMES were taken within 1 hour of bedtime.

The use of a simple diet diary can help patients record what exactly and when they are consuming NMES in their diets.

DISCUSSION POINTS 5

Effective dietary counselling depends partly upon securing a detailed and appropriate diet history.

What types of information should be collected in a dietary history?

Design a method of collecting this information from a patient.

What are the main limitations of your suggested method?

Due to the demands on dentists' time and the fact that their expertise lies within clinical practice, dietary counselling is more often a responsibility of other members of the dental team, such as dental nurses, hygienists, and oral health promoters. It is essential, however, that the whole dental team participates. Dentists can take the lead in highlighting the need for dietary control through their clinical diagnosis.

Box 11.2 Evidence-based dietary guidelines

- Interventions should be developed from behavioural theory and should incorporate well-defined goals. Information alone has only a limited impact.
- Personal contact is important in motivating and monitoring change. A detailed history is required to ascertain all relevant background information.
- Interventions should be tailored to individuals' personal circumstances and ability to change.
- Provision of feedback on dietary changes is important.
- Multiple contacts over a period of time are more likely to achieve desired goals.
- Encouragement and support from family and friends is essential to motivate and maintain change.

(Roe *et al.* 1997.)**Box 11.3** General dietary guidelines

- Base meals on starchy foods such as bread, cereals, rice, pasta, and potatoes.
- Eat lots of fruit and vegetables—at least 5 portions every day.
- Eat more fish—at least 2 portions of fish per week.
- Cut down on saturated fat and sugar.
- Eat less salt—no more than 6 g a day.

The more detailed and time-consuming elements of counselling can then be taken over by the other team members.

Dietary advice given in the dental surgery will obviously be directed largely at preventing and controlling caries. It is vital, however, that all information given out is consistent with general nutritional messages (Food Standards Agency 2001) (see Box 11.3). In the past, the dental profession has been guilty of confusing the public by providing conflicting messages.

Community-wide initiatives

Unhealthy eating practices will only ever be successfully changed through public health action (Watt and

Rouxel 2012; Stuckler *et al.* 2012). Based upon the principles of health promotion, population interventions to promote healthier eating should satisfy the following:

- **Focus:** address the underlying influences on food consumption and be aware of the barriers that prevent certain groups from adopting recommended diets.
- **Evidence:** be evidence-based and ensure that recommendations are consistent and scientifically based.
- **Food chain:** adopt a multi-disciplinary approach in which a range of relevant organizations, agencies, and professionals work together to promote healthier eating.
- **Action:** utilize a complementary range of health promotion strategies that move beyond a health education approach.

Table 11.2 presents the range of strategies and partners that can be involved in a comprehensive public health nutrition programme.

DISCUSSION POINTS 6

Many people have changed their eating habits in line with health advice. However, this is not universal.

What groups in society tend to eat a less healthy diet?

List the barriers that may prevent these groups from changing their eating habits.

Conclusion

Caries remains a significant public health problem, with the frequent consumption of NMES being the principal aetiological factor in its development. Dental professionals have a responsibility to assist their patients to adopt healthier eating practices to maintain good oral health. Effective action can be delivered both at a clinical level and on a community basis.

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Table 11.2 Food policy matrix

Partners									
Intervention	Producers	Processors	Distributors	Catering	Consumers	Government	Media	Health services	Education and Social Services
Education									
Substitution									
Pricing									
Organizational policy									
Regulation									
Community action									

(Modified from Stockley 1993; Watt and Rouxel 2012.)

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12 Fluoride and fissure sealants

CHAPTER CONTENTS

Introduction

Fluoride

Fissure sealants

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Describe briefly how the action of fluoride was discovered.
- Describe how fluoride works in the prevention of dental caries.
- List and describe the methods of fluoride delivery.
- Be able to describe the advantages and disadvantages of each mode of delivery.
- Have an overview of the arguments for and against the use of fluoride in caries prevention.
- Outline the public health importance of fissure sealants.

This chapter links with:

- Trends in oral health (Chapter 6).
- Evidence-based practice (Chapter 7).
- Principles of oral health promotion (Chapter 8).
- Sugars and caries prevention (Chapter 11).

Introduction

Fluoride has made an enormous contribution to declines in dental caries (Kidd 2005; Murray and Naylor 1996). Fissure sealants are a proven preventive agent.

This chapter provides a brief overview of the history of fluoride and presents a brief synopsis of the mode of action, method of delivery, safety, and controversies in the use of fluoride. A public health perspective on fissure sealants will also be presented.

Fluoride

The discovery of the action of fluoride: a brief history

An account of the history of fluoride can be found in Kidd (2005) and Murray *et al.* (2003) and is summarized in this section (see Box 12.1 for key dates). In 1901, Frederick McKay, a dentist in Colorado Springs, USA, noticed that many of his patients, who had spent all their lives in the area, had a distinctive stain on their teeth known locally as 'Colorado stain'. McKay was puzzled and called in the assistance of a dental researcher G.V. Black. They found that other communities in the USA had the characteristic mottling. Their histological examination of affected teeth showed that the enamel was imperfectly calcified, but that decay in the mottled teeth was no higher than in normal teeth.

Box 12.1 Key dates in the discovery of the action of fluoride

1902	Frederick McKay identifies 'Colorado stain' on the teeth of local residents.
1909	McKay undertakes a study describing the prevalence of the stain in the local community.
1933	Mr H.V. Churchill identifies the presence of fluoride in the water supply of Bauxite.
1938	Dr H. Trendley Dean establishes that at levels of 1 ppm in naturally fluoridated communities, caries levels are low and there is no or minimal mottling of the teeth.
1953	F.A. Arnold reports that after 6 years of artificially fluoridating the water in Grand Rapids, USA, caries is reduced by half compared to the control group.

Murray and Naylor 1996.

McKay suspected that something in the water supply was producing the brown stain, and more evidence came from Bauxite, a community formed to house workers of a subsidiary of the Aluminium Company of America (ALCOA). A local dentist noticed that children in Bauxite had mottled teeth, whereas children in nearby Benton did not. McKay investigated the problem but was unable to find a cause for the staining when the water supply was tested. In 1933, Mr H.V. Churchill, Chief Chemist for ALCOA (anxious that aluminium would not be blamed for the mottling), analysed the water and found that the fluoride ion concentration in the water supply of the Bauxite community was abnormally high (13.7 ppm). He tested other communities affected by mottling which had been previously identified by McKay and found that they too had high levels of fluoride present in the water supplies.

In 1938, after extensive surveys of all communities affected by mottling in the USA, Dr H. Trendley Dean (a public health service scientist) summarized the knowledge in relation to tooth mottling and the presence of fluoride in the water. He showed that below a level of 1 ppm fluoride ion concentration, mottling disappeared or was minimal. Further studies in the USA showed that at a fluoride ion concentration of 1 ppm there was a reduction in caries, with no associated or only questionable mottling of the teeth. All these findings had occurred in naturally fluoridated water supplies.

In 1944, Dean and co-workers began to test the safety of artificially fluoridating the water at 1 ppm, and

in 1945 the water supply of Grand Rapids, Michigan, was artificially fluoridated at this level. The town of Muskegon, Michigan, was used as a control (that is, not fluoridated) and the town of Aurora, Illinois, which was naturally fluoridated, was also included in the study for comparative purposes. After 6 years of the study, F.A. Arnold, a co-worker of Dean, reported that the decay experience of children in Grand Rapids had declined by almost half compared to Muskegon and had similar levels to those seen in Aurora.

Fluoridation has therefore come to be defined as: 'controlled adjustment of a fluoride compound to a public water supply in order to bring the fluoride ion concentration up to a level which effectively prevents caries' (Burt and Eklund 1999). This figure is usually around 0.8–1 ppm in temperate climates. In hotter areas where more water is drunk, the level may be adjusted downwards to 0.5 ppm.

How does fluoride act in caries prevention?

A useful summary of the way in which fluorides act to prevent caries is given in Kidd (2005). Kidd describes the three points in time at which fluoride is incorporated into enamel. These are:

- during tooth formation;
- post formation but pre-eruption;
- post eruption and throughout life.

This leads Kidd to make two points of particular importance in developing fluoride strategies and in choosing methods of delivery for individuals or for populations. First, that for fluorides to have a life-long effect they must be used throughout life, and second, that the primary effect of fluoride is topical by preventing demineralization and promoting remineralization.

Methods of fluoride delivery

Following the development of community water fluoridation schemes, other methods of fluoride delivery were developed. Fluoride was added to toothpaste and from the mid-1970s was commonly used. Gels and varnishes were developed and salt fluoridation schemes started where water fluoridation would never be possible. Historically, a distinction has been made between fluoride that is ingested systemically (through water fluoridation, milk, or salt fluoridation) and that which is applied topically (as toothpaste or gels, for example). Such distinctions are not helpful since all methods of fluoride delivery can have both systemic and topical effects. Petersen *et al.* (2012) have distinguished between the automatic delivery of fluoride supplementation and the discretionary delivery.

Numerous clinical investigations have been undertaken to determine the most effective ways of delivering fluoride. More recently, using the results of these clinical investigations, the effectiveness of different modalities of fluoride administration has been assessed through a series of systematic reviews. These analyses have provided very useful comparative data and have also indicated areas where the data are lacking.

These systematic reviews for the primarily topical modalities are summarized in Table 12.1 together with the estimates of the proportion of the DMFT(S) that will be prevented.

A systematic review of fluoridated milk (Yeung *et al.* 2008) found that there was insufficient evidence to show the effectiveness of fluoridated milk in preventing tooth decay, while acknowledging that it gave choice and was a convenient distribution system. It is important to note the way in which this paragraph is worded: ‘there is no evidence’, not ‘this does not work’.

In a critique of a meta-analysis by Yengopal *et al.* (2010), Yeung (2011) found that the available evidence suggested that salt fluoridation was effective, but that the studies were of poor quality and it was not possible therefore to estimate the size of the effect.

Table 12.1 Methods of fluoride delivery, with estimates of effectiveness

Modality	Percentage reduction in DMF(S) with 95% confidence intervals	Reference
Toothpaste	24% (21–28%)	Marinho <i>et al.</i> (2009c)
Toothpaste, different concentrations	23% (19–27%) for 1,000–1,250 ppm	Walsh <i>et al.</i> (2010)
	36% (27–44%) for 2,400–2,800 ppm	
	No significant benefit for 400–550 ppm compared with placebo	
Gels	28% (19–37%) Higher in placebo controlled trials	Marinho <i>et al.</i> (2009d)
Varnishes	46% (30–63%) permanent 33% (19–48%) deciduous	Marinho <i>et al.</i> (2009e)
Tablets, drops, lozenges	24% (16–33%) calculated from three studies	Tubert-jeannin <i>et al.</i> (2011)
Mouth rinses	26% (23–30%)	Marinho <i>et al.</i> (2009f)
Water fluoridation	Estimated 40%	Worthington (2003)

Water fluoridation has been examined through a number of systematic reviews. The York Report (NHS Centre for Reviews and Dissemination 2000) found that there was only a limited quantity of evidence that was of moderate quality from which to draw conclusions. Based on this evidence, the report concluded that:

- Water fluoridation did reduce caries as measured by the number of children who are caries free and by the mean dmft/DMFT scores. Due to the nature of the data it was not possible to be confident of the effect size.
- There was a dose response between the amount of fluoride in the water and the levels of fluorosis.
- No other harmful effects were identified.
- Fluoride was still associated with reductions in caries even in later years when the use of fluoride toothpastes was widespread.
- There was limited evidence to support the view that fluoridation reduced social inequalities.

A subsequent systematic review from the USA (Truman *et al.* 2002) concluded that there was strong evidence that community water fluoridation was effective at reducing the prevalence of dental caries. This review estimated that water fluoridation reduced caries on average by 41%, with a range of 14.5–110%.

Safety of fluoridation and fluorides

There have been claims that fluoridation causes cancer and Down's syndrome, and is environmentally unsound. Numerous studies have investigated the safety of fluoridation and found no evidence to support claims of harmful effects. These have been summarized in the most recent systematic reviews (National Health and Medical Research Council (NHMRC) 2007; NHS Centre for Reviews and Dissemination 2000; Truman *et al.* 2002) and there is no evidence of harm, with the exception of the occurrence of fluorosis. Fluoride can have toxic effects if taken at too high a dose and this is described in detail in Kidd (2005).

Selection of fluorides for use

The use of fluoride should be a routine part of a caries preventive programme for an individual or population, together with dietary control, oral hygiene practices, and potential use of fissure sealants. Choosing which fluorides to recommend or to use requires thinking through a number of issues for each person. Key to these is determining whether the person's water is fluoridated. The most accurate way of checking the water status is to check with the local water company. Most of these have websites which are an excellent source of information. For the majority of people, using a toothpaste with between 1,000 and 1,500 ppm will be sufficient. However, for those with high caries levels, who have difficulty in cleaning their teeth, or who have other problems such as dry mouth, other methods should be added. This may mean the use of gels or rinses or use of a higher-dose fluoride toothpaste; as the concentration of fluoride in toothpaste increases, so does the caries preventive effect (Walsh *et al.* 2010). Toothpaste is self-administered, as are most fluoride mouth rinses. They can be used frequently and at home. Gels and varnishes have to be professionally applied, which increases the cost of their use and markedly reduces their convenience.

The systematic review comparing the effectiveness of the different modalities concluded that there was little difference between the topical modalities (Marinho *et al.* 2009a). There is a small benefit to using more than one method of delivering fluoride (Marinho *et al.* 2009b). Therefore, as the others require professional application, there is little benefit to using topical modalities other than toothpaste, unless there are special indications that a person or population is at particularly high risk of dental caries.

It is worth noting that these reviews have not found evidence to suggest that toothpaste containing less than 1,000 ppm is effective in reducing caries. Parents of young children should be advised to use very small quantities of 1,000 ppm under supervision. There is weak evidence suggesting that using a toothpaste of 1,000 ppm or more before the age of 12 months may cause fluorosis (Wong *et al.* 2010). Parents who are concerned about the risk of fluorosis may wish to use a low-fluoride containing toothpaste but should be advised that it may not prevent decay.

Summary

Fluoridation and other forms of fluoride remain some of the most effective caries-preventive public health measures available. Their use has been shown to be safe and cost effective. However, their introduction into local communities can unleash powerful emotions around issues such as freedom of choice and local democracy. These issues are not trivial in the minds of the community and need to be handled sensitively so that people are exposed to evidence that allows them to make an informed choice.

DISCUSSION POINTS 1

What factors would you consider when asked to prescribe fluoride drops by a mother of two children attending your practice. The children are boys aged 2 and 7 years.

DISCUSSION POINTS 2

Imagine you are a public health dentist who has been asked to present the case in favour of the introduction of fluoridation in your local city. What arguments would you put forward?

Now imagine you are a parent who is very concerned about local democracy and environmental issues. What arguments would you put forward to oppose fluoridation? Look at the arguments for and against fluoridation. Think carefully about the quality of the evidence you are using to support both claims. Try thinking about the evidence using an evidence-based approach.

Fissure sealants

Fissure sealants are materials designed to be placed on the pits and fissures of molar teeth to prevent the development of dental caries. Clinical trials have demonstrated their effectiveness as a caries preventive agent, but their use is still limited within dental services. Fissure sealants have great potential as a preventive measure, but their use within public health programmes has certain limitations.

Fissure sealants as a clinical preventive agent

Fissure sealants have been used since the 1960s, and evidence from a systematic review have demonstrated that they are an effective preventive agent (Ahovuo-Saloranta *et al.* 2009). Light-curing and auto-polymerizing resin materials have been shown to be equally effective. Some studies have compared glass ionomer cements with resin-based materials, but there is insufficient evidence to recommend the use of glass ionomer cements as fissure sealants. A further review compared pit and fissure sealants with the application of fluoride varnishes. There is some evidence of the superiority of resin-based sealants over varnishes, but this requires further research (Hiiri *et al.* 2010). Within clinical practice, evidence-based guidelines have been produced to assist practitioners in the use of this agent (British Society of Paediatric Dentistry 2000).

The decision to apply a fissure sealant should be made on clinical grounds after a thorough clinical examination, supported by radiographs when necessary, and by indications of risk from the patient's medical, social, and family history (Box 12.2).

Fissure sealants as a public health measure

With the vast majority of carious lesions in the population now occurring in pits and fissures, fissure sealants could potentially be used as an effective public health measure in a targeted population approach. However,

DISCUSSION POINTS 3

What are the difficulties of using fissure sealants in a public health programme?

Consider some of the following issues:

- Access of most appropriate groups—addressing inequalities.
- Practical problems—application and monitoring procedures.
- Professional agenda—working with colleagues in the GDS.
- Long-term follow-up.

Box 12.2 Recommendations for use of fissure sealants in clinical practice**Patient selection**

- Children with special needs.
- Children with caries in their primary dentition (dmfs > 2).

Tooth selection

- When the above indications are met, all susceptible sites in permanent teeth should be sealed.
- Sealing of teeth should be undertaken whenever necessary, based upon regular assessment of relevant risk factors.

Clinical circumstances

- Where doubt exists over the caries status of a susceptible site, a bite-wing radiograph should be

taken. If it is certain that the carious lesion is confined to the enamel surface, a sealant should be placed and monitored closely. If caries is found to extend to dentine, a sealant restoration should be placed.

Follow-up

- All sealed surfaces should be regularly monitored, and radiographs taken at appropriate intervals.
- Any defective sealants should be repaired, providing the area is caries free.

(Reproduced with permission from British Society of Paediatric Dentistry 2000.)

many pits and fissures will never decay and so the use of a sealant can be considered wasteful. The use of guidelines enables the targeting of sealant placement towards those most in need. As yet it is not possible to predict exactly which pits and fissures will decay.

Conclusion

Fluoride and fissure sealants are both effective caries preventive agents. In particular, fluoride in toothpaste has made a major contribution to improvements in caries levels around the world. It is essential that the appropriate combinations of fluoride methods are used to ensure minimal risk of fluorosis. Clinicians should follow evidence-based guidelines on fissure sealant use.

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13 Prevention of periodontal diseases

CHAPTER CONTENTS

Introduction

Overview of epidemiology of periodontal disease

Disease process

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Periodontal disease and systemic disease

Preventive strategies

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Further reading

By the end of this chapter you should be able to:

- Describe the key epidemiological features of periodontal diseases.
- Outline the main aetiological factors in periodontal disease.
- Critically assess preventive options for periodontal disease.
- Outline preventive and health promotion approaches appropriate for the prevention of periodontal diseases.

This chapter links with:

- Public health approaches to prevention (Chapter 4)
- Overview of epidemiology (Chapter 5).
- Trends in oral health (Chapter 6).
- Principles of oral health promotion (Chapter 8).
- Oral health education in dental practice settings (Chapter 10).

Introduction

During the last 20 years our understanding of periodontal disease has been dramatically changed. Findings from clinical and epidemiological research have challenged the traditional progressive disease model and questioned the extent of destructive periodontal diseases within the population (Baleum and Lopez 2003; Petersen and Ogawa 2005; Sheiham and Netuveli 2002). Although gaps in our knowledge still exist about the precise nature and full extent of the condition, it is critically important that preventive and public health approaches to periodontal disease are based upon current scientific understanding of the condition (Baleum and Lopez 2003). This chapter will present an overview of current clinical and epidemiological research findings on periodontal disease. This will be followed by a critical review of the various options for prevention of the condition, with particular emphasis on the public health strategies required.

Overview of epidemiology of periodontal disease

Before considering the options for the prevention of periodontal diseases it is important to highlight the main epidemiological features of the condition. Although most adults have some gingivitis and calculus deposits, epidemiological surveys indicate that only approximately 10–15% of the adult population suffer from progressive periodontitis (Albandar 2005; Papapanou 1999; Petersen and Ogawa 2005; Sheiham and Netuveli 2002). The extent and severity of periodontitis increases with age and is more common among men than women. Stark socioeconomic inequalities exist, with lower-income and less-educated groups having significantly worse periodontal health than their more affluent and educated contemporaries (Petersen and Ogawa 2005; Sheiham and Netuveli 2002). As with other chronic diseases, a consistent social gradient exists in the distribution of periodontal diseases within a defined population (Borrell *et al.* 2006; Lopez *et al.* 2006; Sabbah *et al.* 2007). The social gradient indicates that socio-economic differences in periodontal measures do not just occur at the extremes of the social spectrum between the rich and poor in society, but across the entire social hierarchy in a graded step-wise fashion.

Trend data suggest that in high- and middle-income countries, oral hygiene levels have steadily improved in all age groups and there has been a decline in the extent of gingivitis (Hugoson *et al.* 1998; Morris *et al.* 2001). These positive changes are most likely due to changing social norms in society in relation to body hygiene and reductions in smoking rates.

Disease process

During the 1960s and 1970s, periodontitis was considered to be a slowly and continually progressive condition. This *continuous progressive model* was based on the belief that gingivitis, once developed, would progress into the periodontium, leading to loss of attachment, bone destruction, and eventually loss of teeth.

This was thought to affect all the teeth in the majority of the population and to be the main cause of tooth loss in adults. These conclusions, based on research using invalid measures of periodontal disease and on the erroneous interpretation of data from cross-sectional studies, have now been largely dismissed (Baleum and Lopez 2003).

The current concept of periodontal disease presents a very different model. Evidence now indicates that the disease has an episodic nature, in which short bursts of tissue destruction take place in certain teeth, in certain sites—the so-called *burst theories* (Goodson *et al.* 1982; Socransky *et al.* 1984). These short periods of disease activity are followed by longer periods of remission and healing. Although there is still much debate about models of progression, there is widespread consensus that loss of attachment is evenly distributed neither within the mouth nor the wider population (Baleum and Lopez 2003). For the majority of the population, progression of periodontal disease is very slow (Albandar 1990). An average rate of attachment loss of 0.05–0.10 mm per year has been demonstrated (Sheiham and Netuveli 2002). Such a slow rate of progression means that most people will die before they have lost all their supporting alveolar bone.

Aetiology

To be effective, clinical and population preventive measures need to address the causes of disease. With periodontal diseases the main risk factors are plaque, tobacco use, psychosocial factors, and related systemic diseases (Box 13.1). Almost 50 years ago, experimental studies first established the causal relationship between dental plaque and gingivitis (Löe *et al.* 1965). Later, epidemiological evidence confirmed that this link exists in all ages, both sexes, and across ethnic populations (Albandar 2002; Petersen and Ogawa 2005). In contrast, although calculus (calcified plaque) accumulation has often been considered as a direct cause of periodontal disease, there is no evidence to substantiate this claim (Jenkins 1996). Calculus is an inert substance; however, its surface texture may

Box 13.1 Primary causes of periodontal disease

- Plaque
- Smoking
- Systemic infections, for example, diabetes, HIV
- Stress
- Genetic disorders

Factors predisposing to plaque accumulation:

- Overhanging restorations
- Removable partial dentures
- Calculus
- Tooth malalignment

promote plaque retention and accumulation. Plaque control is largely dependent upon effective oral hygiene practices, such as toothbrushing, use of chewing sticks, and interdental cleaning. Most oral health professionals assume that people clean their teeth to avoid periodontal diseases. In fact, oral hygiene practices are influenced by a complex array of motivations and influences. General hygiene practices such as showering and hand-washing are closely related to oral hygiene practices, indicating shared influences (Dorri *et al.* 2009).

DISCUSSION POINTS 1

Outline the range of factors motivating and influencing people to clean their teeth.

Do these different and diverse factors have any implication for preventive measures to encourage people to clean their teeth more effectively?

Compelling epidemiological evidence has also highlighted the important role tobacco use has on the extent and severity of periodontal diseases (Legarth and Reibel 1998). It has been estimated that more than 50% of the periodontitis cases among adults in the USA are caused by smoking (Tomar and Asma 2000). Smoking also adversely affects periodontal and other surgical outcomes through impaired wound healing. Smoking is a complex, socially patterned behaviour which often is initiated in early adolescence.

Nicotine is a highly addictive substance, so smokers often need assistance to successfully quit the habit. Other important risks for periodontal diseases include psychosocial factors such as stress and anxiety, and related systemic conditions such as diabetes.

Impact on individual and society

As outlined in Chapter 1, to decide if a condition can be regarded as a public health problem the impact of the disease on both the individual and society needs to be considered.

DISCUSSION POINTS 2

What impact does periodontal disease have on an individual and the wider society?

Based upon your answer and a review of the epidemiology of the condition, would you consider periodontal disease to be a public health problem? Explain the basis for your answer.

Periodontal disease and systemic disease

A great deal of research and media interest has focused on the link between periodontal diseases and general health. At times, this topic has generated rather inflated claims such as 'Floss or Die'. What does the evidence show? A very recent detailed and comprehensive review undertaken on behalf of the American Heart Association concluded that several observational studies have shown an association between periodontal disease and atherosclerotic vascular disease independent of known confounders such as smoking, age, and diabetes mellitus. These studies do not, however, demonstrate a causal relationship, merely an association (Lockhart *et al.* 2012).

It is postulated in the literature that there is a relationship between periodontal disease and adverse birth outcomes: pre-term birth, low birth weight, and stillbirth, i.e. the presence of periodontal

pathogens may increase the risk of adverse outcomes. Chambrone *et al.* (2011) conducted a systematic review of cohort studies that suggested that while there was an association between periodontal disease and pre-term birth and low birth weight, this finding should be treated with caution because of the small number of studies included in the review and the high degree of unexplained heterogeneity (inconsistency in results across studies). A causal relationship was not demonstrated.

Recent research suggests there may be a relationship between periodontal disease and diabetes (Bascones-Martinez *et al.* 2011). Diabetes may increase the risk and severity of periodontal disease, while periodontitis has been identified as a risk factor for poor metabolic control in people with diabetes (Lamster *et al.* 2008). There appears to be an association between oral infection, sugar metabolism, and atherosclerosis, which suggests a plausible theoretical relationship between periodontal disease and metabolic syndrome (Bascones-Martinez *et al.* 2011). Of public health significance is the fact that improvement in periodontal disease may improve glycaemic control in Type 2 diabetes, and improved glycaemic control may contribute to better control of periodontal disease.

Preventive strategies

Goals for prevention

In any preventive strategy it is critical that clear and realistic targets are set. This is important in determining the selection of appropriate actions and devising relevant evaluation systems. In the prevention of periodontal disease it is vital to have targets that are based on up-to-date knowledge of the disease process and contemporary epidemiological data. If the overall aim of a dental public health strategy is the maintenance of a functional, and aesthetically and socially acceptable, natural dentition for the lifespan of most people, how can this be translated into a suitable goal for periodontal health?

Sheiham and Netuveli (2002) have proposed the following strategic goal for periodontal health:

A reasonable goal for periodontal disease control is to achieve a level of plaque which is compatible with a rate of periodontal destruction which will retain teeth essential for an socially and personally acceptable dentition for a lifetime; one that does not cause handicaps. Reduction in the quantity of dental plaque will reduce the severity of gingival inflammation and the probability of destructive periodontal diseases.

This acknowledges that a plaque-free mouth is neither realistic nor necessary. Instead, some plaque, calculus, gingivitis, and attachment loss can be considered acceptable as long as this does not endanger the survival of the dentition.

Strategy selection

As outlined in Chapter 4, the medical and dental professions traditionally have tended to concentrate on a high-risk preventive strategy (Rose 2008). The limitations of this are now well recognized and the example of periodontal disease prevention provides a good example of the problems with adopting only a high-risk approach.

The success of the high-risk approach depends upon being able to identify individuals at particular risk of developing future disease at an early stage when intervention will alter the natural history of the condition (Rose 2008). A screening test with a high sensitivity and specificity is therefore essential. Although there is currently a great deal of research into periodontal disease predictors, at present no screening test is available that can be recommended for use in clinical settings or in population screening programmes. At present, the best predictor of future breakdown is past experience of disease.

The limitations of the high-risk approach highlight the need to focus on a population strategy. Such an approach, by addressing the underlying causes of the problem (in this case plaque levels and smoking), reduces the risk for the whole population and

therefore produces a greater benefit overall (Rose 2008). A modified approach, the targeted-population strategy, can also be used to direct action at particular high-risk groups within the population (but not individuals).

To control periodontal diseases in the population, a combined approach is therefore needed. Strategies to prevent and control the disease would consist of:

- a population strategy aimed at promoting self-care practices and, in particular, effective oral hygiene practices to reduce plaque levels in the community and a reduction in tobacco use;
- a secondary preventive strategy to detect and treat people with destructive periodontal disease;
- a high-risk strategy targeting preventive and therapeutic care to individuals at special risk, such as diabetics.

The following sections will outline possible preventive measures at both a clinical and population level.

Prevention in clinical practice

The promotion of periodontal health and prevention of periodontal disease progression is a core professional responsibility of the dental team (Department of Health 2012). To be effective, professional preventive support needs to be based on sound scientific evidence and relevant to the needs of the patient. The Basic Periodontal Examination (BPE) is a useful means of routinely assessing and monitoring the periodontal health of patients (British Society of Periodontology 2011).

The primary goal of oral hygiene instruction is for oral health professionals to impart to their patients the necessary knowledge and skills required to perform effective oral hygiene self-care practices. This is the only rational long-term method of controlling plaque. As outlined in Chapter 10, a change in behaviour, such as a modified toothbrushing technique, requires more than just a leaflet with some information. Effective tooth-cleaning is a skill that requires detailed instruction, practice, and feedback (see Box 13.2).

Box 13.2 Key health education messages to promote periodontal health

- Children under 7 years should be supervised with their brushing.
- Use manual or powered toothbrush.
- Gentle pressure—hold brush with a pen grip.
- Use of floss, sticks, and interdental aides are optional and need professional advice.
- Toothbrush size: use a small head with a medium texture.
- Replace toothbrush when bristles become excessively splayed.
- Chlorhexidine is the most effective chemical plaque suppressant.
- Do not smoke.

Department of Health 2012.

Health education directed at improving oral hygiene should be provided in a supportive and personalized format that recognizes the individual's concerns and circumstances. Effective communication skills are an essential requirement in this process; as well as verbal advice, high-quality health education materials such as leaflets can be an important source of additional help and support.

DISCUSSION POINTS 3

Outline the different steps involved in giving oral hygiene instruction (OHI)?

What ways would you suggest to evaluate the effectiveness of clinical OHI?

In addition to effective plaque control, all dental patients need to be helped to quit smoking, as tobacco use is a major aetiological factor in periodontal diseases and other chronic conditions, such as a range of cancers and cardiac conditions. All dental patients should have their smoking status assessed at the start of every course of treatment (Department of Health 2012). Any dental patients who are smokers should be given personalized advice on the effects of tobacco on their oral and general health and the need to quit the habit. In the UK, NHS

Stop Smoking Services are universally available and provide a range of evidence-based support and treatment. Dental patients who wish to quit should therefore be referred to the local NHS Stop Smoking Services for expert advice.

For the small number of people with rapidly destructive periodontal disease, e.g. patients with uncontrolled diabetes, more intensive therapy and support will be required. Appropriate anti-microbial therapy and surgical treatment can then also be offered. In these high-risk groups the importance of providing appropriate behavioural support and encouragement is essential. It is important to note that a relatively small proportion of dental patients are considered high risk in terms of their periodontal needs.

Public health approaches

The most significant means of preventing periodontal disease will be achieved through population-based methods aimed at reducing overall plaque levels and smoking rates (see Box 13.3). Clinical preventive measures alone will not prevent periodontal diseases; public health measures are also an essential element of a preventive strategy (Watt and Petersen 2012).

Mouth feel, freshness, mouth smell, and appearance are the common reasons for toothbrushing (Gift 1986).

Box 13.3 Public health measures to reduce periodontal diseases

- Integrate oral hygiene into body cleanliness education at nurseries and schools.
- Incorporate the importance and skills of oral hygiene into training of health, education, and social care professionals.
- Use fiscal policy to reduce costs of oral hygiene aids and toothpaste: remove VAT at national level and/or sell products at cost price within NHS premises.
- Organizational policy: ensure oral hygiene is placed on health-promoting schools' agendas—structural change within schools regarding provision and design of toilet facilities.
- Comprehensive public health strategies to reduce smoking, especially amongst low-income groups.

Mouth-cleaning is part of personal hygiene and grooming behaviour, and therefore has a strong social motivation rather than purely a health focus (Dorri *et al.* 2009; Hodge *et al.* 1982). Isolated one-off campaigns specifically designed to improve oral hygiene do not produce long-term sustainable changes in behaviour and are very costly (Kay and Locker 1996; Sprod *et al.* 1996; Watt and Marinho 2005). Instead, schemes to promote oral cleanliness should be incorporated into health education programmes that are aiming to improve body cleanliness and grooming. This integrated approach, based upon sound educational theory, is far more likely to produce long-term behaviour modification, partly through the impact of primary and secondary socialization on behaviour. In addition, professional education on tooth-cleaning practices to influential professional groups such as health visitors, pharmacists, and teachers may be a far more effective means of disseminating a message to the general public than direct contact.

One of the major reasons for improvements in periodontal health is the reduction in overall smoking rates in most high- and middle-income countries. Further improvements in periodontal health require coordinated public health in tobacco control. A major success story in public health has been the progress made in combating the tobacco epidemic around the world. Through the global leadership of the WHO, the Framework Convention on Tobacco Control (FCTC) is an outstanding example of how international collaboration can be harnessed to formulate effective public health policy (WHO 2003). The FCTC adopted a radical approach that aimed to tackle both the supply and the demand for tobacco through a range of complementary actions. This is one of the best examples of upstream health promotion.

Other environmental and structural action to promote better body and oral hygiene have an important role to play in promoting periodontal health. For example, the provision of appropriate hygiene facilities within schools, factories, and offices may encourage tooth-cleaning. Many oral hygiene aides are currently very expensive, and for a family on a low income a new toothbrush is unlikely to be a major priority. Marketing practices that promote high-quality, low-cost oral

hygiene products could be particularly important in areas of deprivation.

Potentially, the most significant development to affect population plaque levels is not related to any health promotion intervention per se, but due instead to the commercial marketing and sales of newly developed anti-plaque and anti-calculus toothpastes by toothpaste manufacturers. Rather like the decline in caries, plaque levels may be significantly reduced by changes in commercial product formulation rather than dentists' efforts.

Conclusion

The epidemiological data on periodontal disease highlight that the severe destructive form is relatively rare, and that the condition is not the most important cause of tooth loss for most adults. Dental plaque and smoking are the two most significant aetiological factors. Traditional clinical approaches to the prevention of periodontal disease are very expensive and most unlikely to successfully treat the condition at a population level. Public health approaches to plaque and smoking reduction offer far greater benefits at reduced cost.

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14 Oral cancer prevention

CHAPTER CONTENTS

Introduction

Epidemiology of oral cancer

Limitations of treatment

Aetiology

Preventive options

A clinical approach to the prevention
of oral cancer

Public health approach

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Outline the principal epidemiological facts for oral cancer in the UK.
- Describe the aetiology of oral cancer.
- Identify opportunities for prevention of oral cancer within the clinical environment.
- Outline a range of public health approaches to oral cancer prevention.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- Determinants and definitions of oral health (Chapters 2 and 3).
- Public health approaches to prevention (Chapter 4).
- Principles of oral health promotion (Chapter 8).
- Overview of behaviour change (Chapter 9).
- Oral health education in dental practice settings (Chapter 10).

Introduction

Oral cancer is one of the few conditions that dental professionals may encounter within their surgeries that can be fatal. It is therefore essential that members of the dental team understand the epidemiology and natural history of the condition and possible options for prevention, screening, and treatment.

From a public health perspective, oral cancer presents many interesting challenges. First, is the condition a public health problem? In this chapter the epidemiology of oral cancer will be reviewed to highlight the extent, trends, and impact of the condition. Second, what options exist to prevent the disease and how best can these be implemented? As we will discuss, although progress has been made in the treatment of the disease, survival rates have not improved substantially in recent decades (Cancer Research UK 2012; ONS 2005; Stell and McCormick 1985). The potential for screening of the condition has been extensively reviewed, and currently a national screening programme is not recommended due to a lack

of evidence on effectiveness (Chamberlain 1993). Although various initiatives have recently attempted to coordinate and expand the prevention of oral cancer (Cancer Research UK 2005; British Dental Association 2000; NHS Scotland 2005), the preventive activities presently undertaken by the dental profession alone are unlikely to be successful. A clear need exists for a more comprehensive public health strategy to tackle the underlying causes of the disease in a coordinated and strategic fashion. This chapter will therefore outline the scope and detail of such a strategy.

Epidemiology of oral cancer

Incidence rates and trends

Oral and oropharyngeal cancers commonly include cancer of the lip, tongue, mouth, oropharynx, piriform sinus, hypopharynx, and other ill-defined sites of the lip, oral cavity, and pharynx (ICD-10, C00–C06, C09–C10, and C12–C14). In the UK, oral cancer is the fifteenth most common cancer, accounting for around 2% of all new cases. In 2009 there were 6,236 new cases of oral cancer in the UK: 4,097 (66%) in men and 2,139 (34%) in women (Cancer Research UK 2012). The most commonly diagnosed type of oral cancers are cancer of the mouth and tongue, collectively

accounting for 60% of cases in the UK. A north–south divide in oral cancer incidence exists across the UK, with highest rates in Scotland, Northern Ireland, and the north of England. Incidence rates are strongly related to age, with almost half of cases occurring in people aged 65 and over. Oral cancer incidence is also strongly associated with deprivation (Figure 14.1). A recent systematic review and meta-analysis showed that oral cancer rates across the world, including low-income countries, were consistently higher amongst poorer, less-educated and lower social classes (Conway *et al.* 2008). Since the mid-1970s, oral cancer incidence rates in the UK have risen by more than a quarter (Figure 14.2). The reason for this change is not clear.

DISCUSSION POINTS 1

What possible explanations could be proposed to explain the dramatic decline in oral cancer between 1911 and the early 1970s?

Address this question from a public health perspective and consider what evidence you have to back up your ideas.

Internationally the incidence varies considerably, with very high rates found particularly in India and Sri Lanka, where oral malignancy is the commonest type of cancer, accounting for 40% of all cancers.

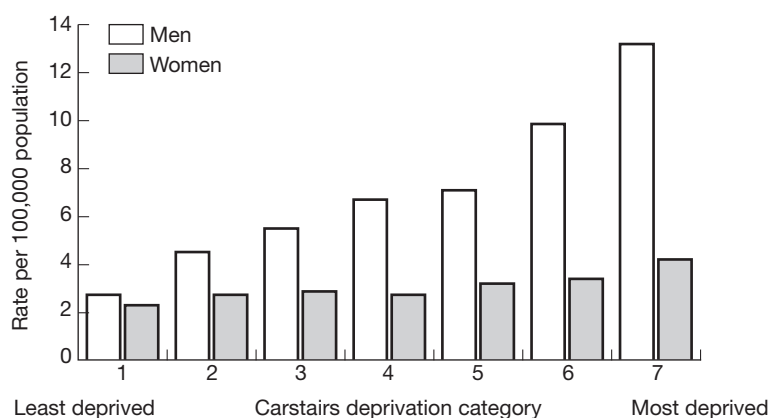


Figure 14.1 Incidence rates of oral cancer by deprivation, 1986–1995.

Reproduced from CRC CancerStat report, with permission from the Cancer Research Campaign 2000.

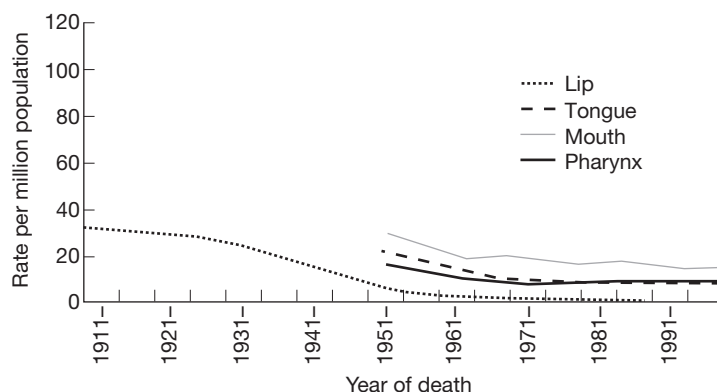


Figure 14.2 Age-standardized mortality rates for male cancer of the lip, tongue, mouth, and pharynx, England and Wales, 1911–1998.

Reproduced from CRC CancerStat report, with permission from the Cancer Research Campaign 2012.

Limitations of treatment

Although advances in technology and surgical techniques may have improved the quality of life for people affected by oral cancer, no marked improvements in survival rates have been detected in recent decades (Cancer Research UK 2012; ONS 2005; Stell and McCormick 1985). The overall 5-year survival rate is around 50%, although for lip cancer 90% will survive the disease for at least 5 years. In general, prognosis worsens with increasing inaccessibility of the tumour. Survival rates for cancers of the tongue, oropharynx, and oral cavity vary significantly between different socio-economic groups, with the most disadvantaged patients dying sooner than more affluent ones (Coleman *et al.* 1999). In total, almost 2,000 people died of oral cancer in 2010 in the UK (Cancer Research UK 2012).

The ability to detect lesions at a very early stage is crucial for the effective treatment of the disease (Box 14.1).

Box 14.1 Factors influencing survival from oral cancer

- Site of lesion (the further back in the mouth, the poorer the prognosis).
- Size of lesion.
- Degree of differentiation.
- Involvement of regional lymph nodes.
- Presence of distant metastases.

Aetiology

The cause of oral cancer is largely understood and many cases could be prevented if the appropriate measures were undertaken. The key aetiological factors associated with the development of oral cancer are listed in Box 14.2.

The two most important risk factors associated with oral cancer are high consumption of tobacco and alcohol, which together cause 75–90% of all cases. These

Box 14.2 Aetiology of oral cancer

Established risk factors

- Smoking tobacco.
- Chewing tobacco/oral snuff.
- Chewing betel quid (pan).
- Human papillomavirus (HPV) infection.
- Heavy consumption of alcohol.
- Presence of potentially malignant lesions.

Predisposing factors

- Dietary deficiencies (vitamins A, C, and E, and iron).
- Genetic disposition.
- Sunlight (lip cancer).
- Dental trauma.

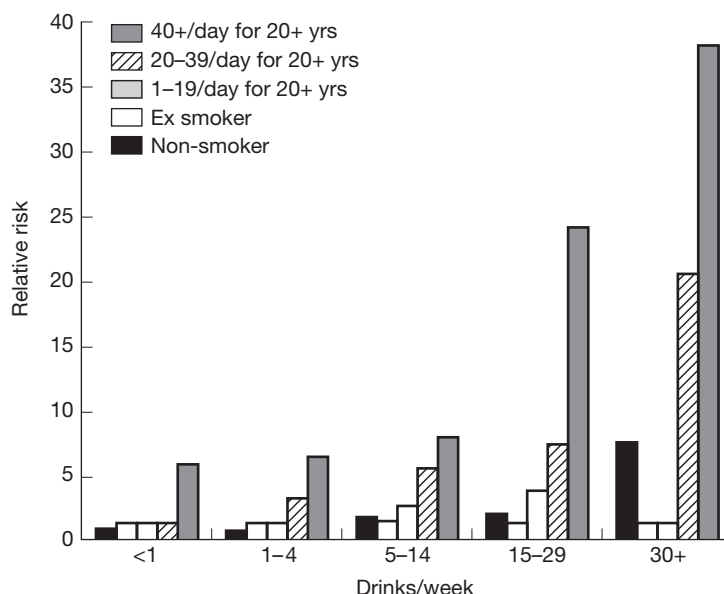


Figure 14.3 Relative risk of oral/pharyngeal cancer in males by alcohol/tobacco consumption using US measures. Reproduced from CRC CancerStat report, with permission from the Cancer Research Campaign 2012.

factors act synergistically to multiply the risk of oral cancer, as shown in Figure 14.3.

Tobacco can be used in several ways. In the UK, cigarette smoking is the most common form of tobacco use, but the habit is not practised evenly across the population. Since the 1960s, smoking has become increasingly associated with social deprivation and poverty. Increasingly, smoking is becoming restricted to more disadvantaged groups in society.

Tobacco can also be chewed alone or added to betel quid (pan). These habits have a strong cultural basis and are common amongst certain minority ethnic groups (Johnson and Warnakulasuriya 1993). Smokeless tobacco and betel quid are both carcinogenic (NICE 2012).

Alcohol is a major risk factor for oral cancer, with around 37% of oral and pharyngeal cancers in men and 17% in women in the UK linked to alcohol intake (Parkin 2011). Alcohol consumption in the UK doubled between the 1950s, from 3.9 to 8.6 litres per head per year, and there has been a steady shift in consumption away from beers to wines and spirits (British Beer and Pub Association 2002).

Other risk factors include poor diet, viral infections, and oral lesions. A diet rich in fruit and vegetables reduces

oral cancer risk. A meta-analysis showed a significant risk reduction of about 50% for each additional daily serving of fruit and vegetables (Pavia *et al.* 2006). Infection with the human papillomavirus (HPV) increases risk, particularly in the oropharynx. Certain oral lesions such as leukoplakia (white patches) and erythroplakia (red patches) can precede the development of malignancies. However, the rate of malignant transformation is very low.

Preventive options

The treatment of oral cancer is expensive for society, and for the individual affected the impact in terms of physical, psychological, and emotional costs is considerable; yet the prognosis is still poor. However, at least three-quarters of oral cancers could be prevented if tobacco and alcohol consumption were better controlled (Cancer Research UK 2012). The importance of developing and implementing effective and appropriate preventive measures is therefore obvious. The dental profession has tended to focus attention at an individual level and especially on the need for oral cancer screening. Although preventive action at a clinical level is important, there is

also a need for a broader public health strategy that addresses the underlying cause of oral cancer.

To screen or not to screen, that is the question

A UK working group considered the possibility of recommending a national screening programme for oral cancer (Speight *et al.* 1993). The expert group concluded that due to insufficient evidence on the costs, benefits, effectiveness, feasibility, and appropriateness of screening for oral cancer, such a programme could not be recommended. An alternative option is the opportunistic screening of high-risk groups attending primary dental care services. A major limitation of this approach is the fact that many high-risk individuals, i.e. older men who smoke and drink heavily, are not likely to attend dentists on a routine basis (Netuveli *et al.* 2006).

DISCUSSION POINTS 2

- Outline the principles of screening.
- How does the screening of oral cancer comply with these principles?
- What further research is required before a national oral cancer screening programme could be recommended?

A clinical approach to the prevention of oral cancer

Comprehensive medical history

A comprehensive and thorough medical history should always be taken with all new patients, and at recall appointments for existing patients. All practitioners should routinely ask their patients about their tobacco and alcohol habits. This information should be recorded in the patient notes and referred to at subsequent appointments when appropriate.

Detailed and thorough oral examination

A thorough and detailed extra- and intra-oral examination of the hard and soft tissues should be undertaken

during dental check-ups, especially for those at greater risk of oral cancer. These include men aged 50 years and over, smokers and heavy drinkers, people who regularly chew betel quid (pan), patients with a history of cancer, and those with leukoplakia and erythroplakia.

Patient counselling

The dental team has an important role to play in advising and supporting their patients in adopting healthier choices. In the prevention of oral cancer, three key messages need to be stressed:

- 1 Stop smoking or chewing tobacco.
- 2 Be moderate in alcohol use (3–4 units daily for men and 2–3 units daily for women).
- 3 It is important to eat at least five or more portions of fresh fruit and vegetables a day.

Smoking is an addictive behaviour with strong social associations and is very difficult to stop. However, advice, support, and encouragement from primary health care professionals can have a significant impact on those who want to quit. Although relatively few well-designed studies have assessed the effectiveness of smoking cessation initiated in dental practice settings, the available evidence suggests that success rates similar to other primary care settings can be achieved (Cohen *et al.* 1989; Smith *et al.* 1998). It has been estimated that between 63,000 and 190,000 smokers would stop smoking in a year if all dentists routinely offered smoking cessation advice (Watt *et al.* 2000).

DISCUSSION POINTS 3

- Outline the range of reasons why people may start to smoke.
- Most people are fully aware of the health risks of smoking, so what factors prevent individuals from successfully quitting?

Smoking cessation is one of the areas of health promotion where good evidence exists to demonstrate effectiveness (NICE 2006; Raw *et al.* 1998). It is therefore very important that members of the dental team

become involved in smoking cessation activity within their practices in the following manner:

- **ASK**—all patients should have their smoking status (current, ex-, never smoked) established and checked on a regular basis.
- **ADVISE**—all smokers and chewers of tobacco receive advice on both the value of stopping and the health risks of continuing
- **ACT**—all smokers receive advice on the value of attending their local NHS Stop Smoking Services for specialized help in stopping (Department of Health 2012).

See Figure 14.4 for the suggested care pathway.

Another important opportunity for the dental team is in advising young people not to experiment with cigarettes. Most smokers start the habit when they are 11–14 years old, and once they are smoking a few cigarettes, many then become addicted to nicotine and find it very difficult to quit. The dental team is in a unique position to influence this age group, as many young people will have little contact with other members of the health team. In addition, the immediate effects of smoking on the mouth, such as stained teeth and halitosis, may be a concern for many people and therefore a useful motivating factor to quit.

Although very limited research has been undertaken in dental settings, a substantial body of research has demonstrated the effectiveness of brief alcohol interventions delivered in general medical and other primary care settings (Kaner *et al.* 2007). Very brief advice on the harmful effects of high alcohol consumption on oral health is therefore an important preventive role for the dental team.

Prompt and appropriate referral

It is essential that dental practitioners should request an urgent specialist appointment for any patient with a lesion that is suspected of malignancy (Cancer Research UK 2005). Prompt referral is critical as any delay may affect the long-term prognosis. Clear and concise details within the referral letter aid the referral process.

Public health approach

Due to the recognized limitations of current treatment modalities and the difficulty of introducing a comprehensive screening programme, the only means of significantly reducing the incidence of oral cancer is through the development of a public health strategy that tackles the underlying causes of the condition.

In line with the principles of health promotion outlined in Chapter 8, a public health strategy to reduce oral cancer should be based upon the following principles:

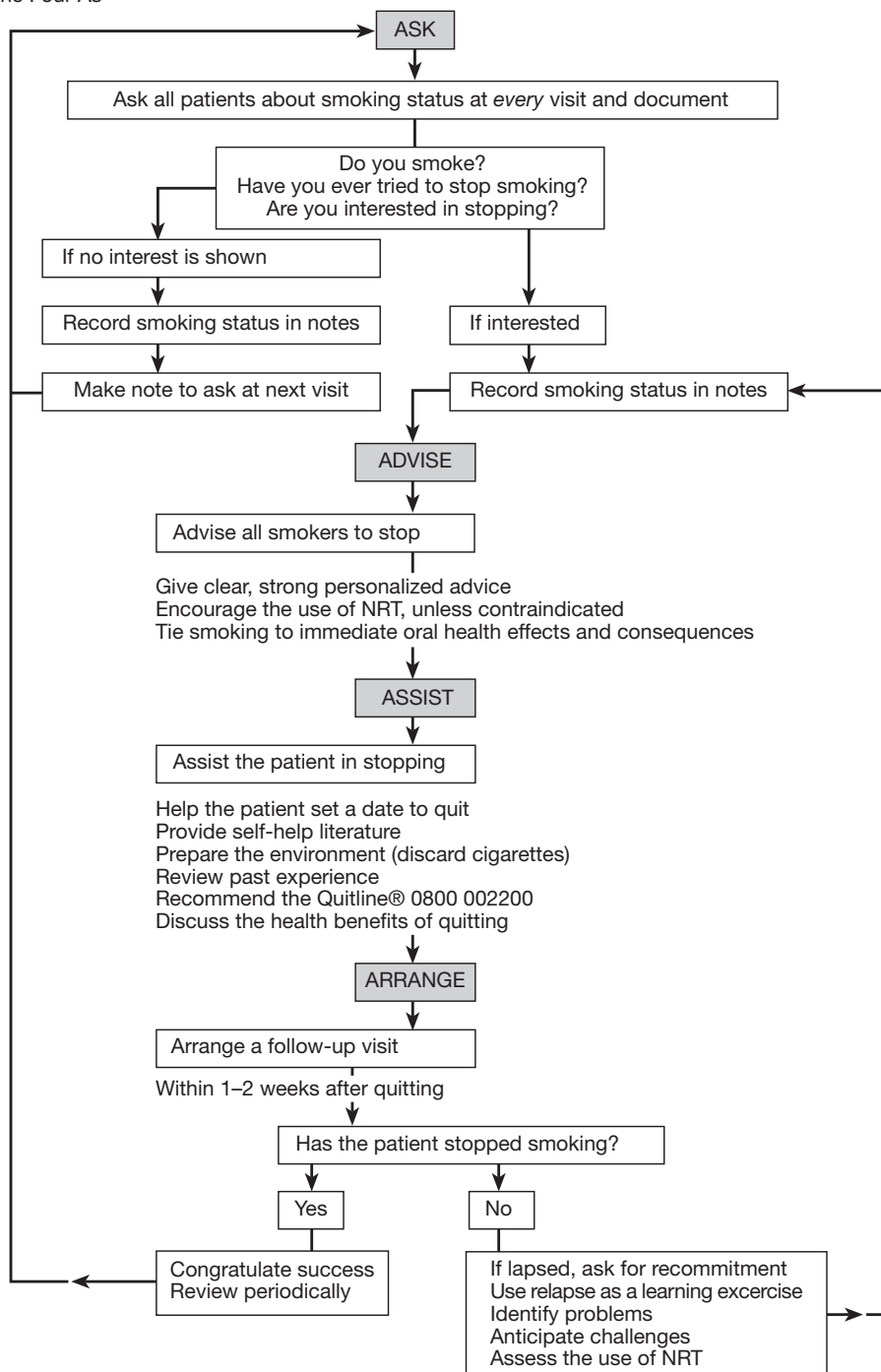
- An understanding of the *underlying social, economic, and political determinants* of oral cancer; that is, the broad range of factors influencing tobacco and alcohol use and the barriers to increasing fruit and vegetable consumption.
- A *directed population approach* that targets action at high-risk groups and addresses health inequalities. (A high-risk approach alone is not applicable due to the limitations of current screening methods.)
- It should be based upon a *common risk-factor approach* in which dental health professionals collaborate with other health professionals to address common threats to oral and general health, for example, tobacco and alcohol.
- It recognizes the need to work in *partnerships* across sectors and agencies beyond health services.
- It should be based upon the need to work with *community members*, addressing their concerns and jointly tackling the underlying causes of the problem.
- It stresses the importance of utilizing a *range of complementary health promotion approaches* beyond a sole reliance on health education (see Box 14.3).

DISCUSSION POINTS 4

What sectors and agencies outside the health services could contribute to an oral cancer public health strategy?

What incentives could be used to encourage these groups to become involved in such a strategy?

The Four As

**Figure 14.4** Smoking care pathway.

Reproduced with permission from Watt and Robinson 1999, © HMSO.

Box 14.3 Public health approaches to oral cancer prevention**Build healthy public policy**

- Tighten restrictions on tobacco and alcohol advertising and promotion.
- Fiscal policy: subsidize the costs of healthier choices, for example fruit and vegetables, alcohol-free drinks, and smoking substitutes (Nicotine Replacement Therapy).
- Improve labelling on betel quid products and alcohol products.

Create supportive environments

- Smoke-free public spaces, for example cinemas, public transport.
- Increase availability of fresh fruit and vegetables—school canteens and tuck shops.

Strengthen community action

- Promote establishment of local community-based smoking-cessation support groups.
- Establish help-lines that appeal to population groups with high rates of smoking.

- Support establishment of local food cooperatives selling cheap, high-quality fruit and vegetables.

Develop personal skills

- Expand personal and social education in schools (life skills—empowerment, refusal, and negotiation skills, etc.).
- Incorporate tobacco and alcohol control within Health Promoting Schools initiatives.

Reorient health services

- Expand health professionals' education and training in smoking cessation and alcohol control.
- Increase numbers and range of health promotion professionals within the NHS with expertise in smoking and alcohol support.
- Establish evidence-based smoking and alcohol preventive services within primary care settings.

Based on WHO 1986.

DISCUSSION POINTS 5

An innovative health promotion programme in east London has attempted to work with the local community to reduce the oral health risks associated with betel quid (pan) chewing (Croucher and O'Farrell 1998). Based upon the principles of health promotion, outline the approach you would recommend for an oral cancer strategy in a community such as east London.

Based upon the Ottawa Charter (WHO 1986), Box 14.3 outlines a range of options for a public health approach to oral cancer prevention.

Conclusion

Although the number of oral cancer cases in the UK is relatively small, the impact of the disease on individuals affected and the wider society is great. Advances in

treatments may have improved the quality of life of oral cancer sufferers, but survival rates have remained largely unchanged for several decades. A national screening programme is not currently recommended due to the limitations of available detection methods. The cause of the disease is, however, well established and the potential for effective prevention is considerable. A greater emphasis needs to be placed upon implementing evidence-based preventive measures within clinical dental settings. In addition, there is a need for a supporting public health strategy to address the wider social, economic, and political determinants of oral cancer.

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15 Public health approaches to the prevention of traumatic dental injuries

CHAPTER CONTENTS

Introduction

Epidemiology of traumatic dental injuries

Impact of condition

Aetiology

Limitations of treatment and preventive options

Public health agenda

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Describe the key epidemiological data on traumatic dental injuries.
- Identify the main aetiological factors in traumatic dental injuries.
- Critically assess preventive approaches in traumatic dental injuries.
- Present public health approaches to the prevention of traumatic dental injuries.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- Public health approaches to prevention (Chapter 4).
- Overview of epidemiology (Chapter 5).
- Principles of oral health promotion (Chapter 8).

Introduction

Injuries are a major cause of morbidity and mortality in both developed and developing countries around the world. It is estimated that, of the total burden of global disease, just over 12% is attributable to injuries (WHO 2008). Depending on the cause, injuries can be divided into unintentional and intentional. Two-thirds of the global burden of injury is classified as unintentional and these are mainly caused by road traffic injuries and falls. Intentional injuries are caused by violence. The term 'accident' is discouraged, as this suggests that chance or bad luck are the main causes of the harmful event (Davis and Pless 2001). Injuries are in fact predictable and preventable in most cases. The multiple and interacting causes of injury provide a good example of the broader determinants of health. Injuries are not solely caused by

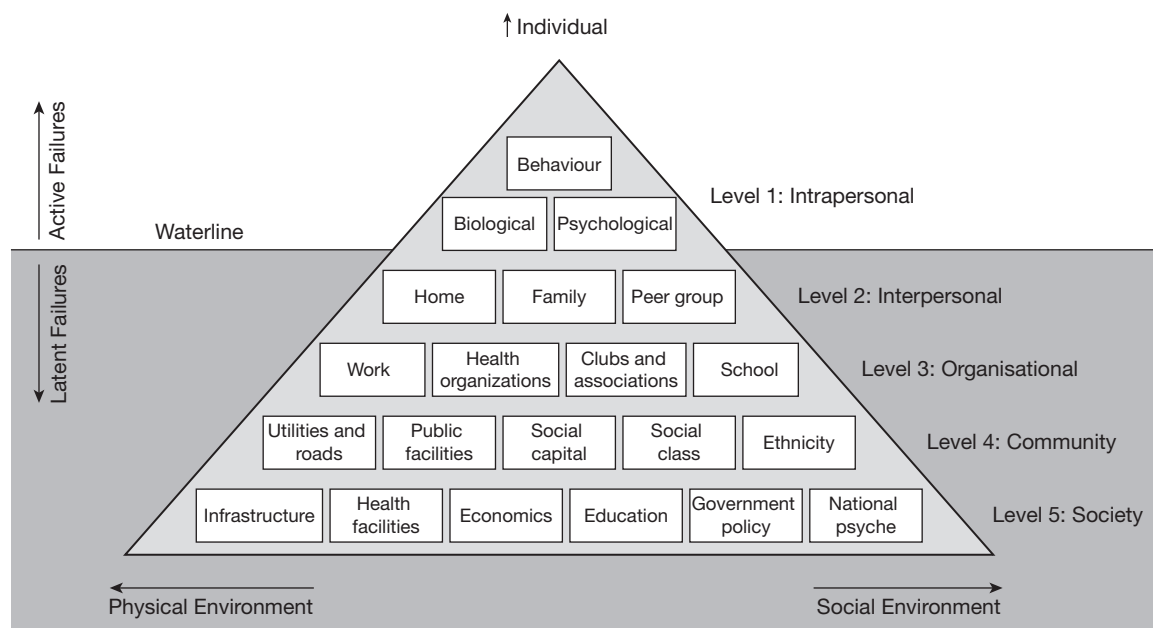


Figure 15.1 The injury iceberg model.

Reproduced from Hanson, D., Hanson, J., Vardon, P., Mcfarlane, K., Lloyd, J., Muller, R. & Durrheim, D. (2005). The injury iceberg: an ecological approach to planning sustainable community safety interventions. *Health Promotion Journal of Australia*, **16**, 5–10.

the behaviour of individuals. Instead, the underlying influences and causes of the behaviour, the broader context, need to be understood. Hanson *et al.* (2005) have proposed an ecological approach that describes three key dimensions: the individual, the physical environment, and the social environment (Figure 15.1). A better understanding of the true causes of this major global public health issue will help to inform more effective intervention strategies.

In dentistry, increasing clinical and public health interest has focused on the issue of traumatic dental injury (TDI). This chapter will present an overview of the epidemiology of TDI. The impact of the condition will be highlighted and the key aetiological factors identified. A critical appraisal of treatment and preventive approaches will be presented and an alternative public health approach will be outlined.

Epidemiology of traumatic dental injuries

Data on the extent and severity of TDIs are rather limited in comparison to the amount of information available in relation to dental caries and periodontal diseases. Comparisons between populations is also hampered, as surveys often use different methods to measure and assess TDIs. A recent review of the global literature indicated that amongst pre-school children approximately one-third had suffered TDI in the primary dentition (Glendor 2008). It was estimated that a quarter of all school children and almost a third of adults had suffered trauma to the permanent dentition, although significant variations existed both between and within countries.

Data from the most recent 2003 national UK child dental survey indicate an overall prevalence of dental injuries of 11% (Lader *et al.* 2005), a reduction from

17% in the 1993 national survey (O'Brien 1994). Epidemiological data consistently show higher rates of TDIs amongst males and the majority of injuries take place during childhood and adolescence (Glendor 2008). Conflicting evidence exists on the effect of socioeconomic status and TDIs.

DISCUSSION POINTS 1

Several different indices have been developed to assess the prevalence of dental injuries. What difficulties may be associated with the measurement of dental injuries?

Impact of condition

Injuries to teeth vary greatly in severity, from minor enamel cracks to tooth fracture and luxation. The impact of the condition on the individual affected will therefore also vary greatly. However, TDIs are often a cause of considerable pain and discomfort and associated emotional distress. Dental injury may ultimately lead to psychological and social impacts on the quality of life of those affected. In addition, the management and treatment of TDIs is often very time-consuming and costly.

With a substantial decline in caries in most developed countries, the costs of treating dental injury may soon equal that of caries. Although it is very difficult to calculate exact costings for different elements of dental care, those for the management and care of dental injuries are substantial due to the complexity and long-term nature of treatments. Research from Scandinavia in the 1990s estimated a cost of US \$3.2–3.5 million per million subjects (Andreasen and Andreasen 1997).

DISCUSSION POINTS 2

Outline the range of possible impacts dental injury may have on an individual's quality of life.

Describe the potential impact of dental injuries on the wider society.

Aetiology

TDIs are caused by a complex array of clinical, behavioural, social, and environmental factors (Glendor 2009). As in many other areas of dentistry, the individual clinical aetiological factors have tended to be highlighted as the most important. Incisal protrusion, increased overjet, and inadequate lip coverage are all important predisposing factors, but it is essential that the social, economic, and environmental determinants are also recognized as being fundamentally important (Box 15.1). A strong social-class gradient exists for childhood deaths caused by injury (Department of Health 1999), although the link between dental trauma and deprivation has not been thoroughly investigated. However, the surveys from deprived areas in the north-west of England and the East End of London have shown far higher rates of dental injuries than the

Box 15.1 Risk factors for dental injuries

Clinical predisposing factors

- Incisal protrusion
- Increased overjet (> 6 mm)
- Inadequate lip coverage

Behaviours

- Risk taking
- Participation in contact sports

Psychosocial

- Stress
- Low self-esteem
- Aggression

Social/environmental

- Violence
- Bullying
- Deprivation—overcrowding
- Falls
- Traffic and bicycle accidents
- Poor environments

national figures (Hamilton *et al.* 1997; Marcenés and Murray 2001). The study in London identified a greater risk of dental injury for subjects living in overcrowded households (Marcenés and Murray 2001).

Limitations of treatment and preventive options

The clinical approach to the treatment and prevention of TDIs is limited (Box 15.2), and provides a good example of the shortcomings of clinical dentistry when no complementary public health approach is adopted. Orthodontic treatment, restoring traumatized teeth, and the provision of mouth guards for contact sports—the traditional approaches to treatment and prevention of TDIs—will only have a limited effect on the problem of dental injury.

The most recent UK national children's dental survey showed that the majority of traumatized incisors were left untreated (Lader *et al.* 2005). As mentioned previously, the costs of providing appropriate treatment for dental trauma cases would be substantial, assuming of course that clinicians in primary dental care have the skill and experience to successfully treat cases that present to them. It is apparent that, in addition to high-quality clinical care, greater emphasis needs to be placed upon reducing the number of cases that occur. This requires an upstream public health approach that directs attention at changing the underlying conditions and causes of the problem.

Box 15.2 Limitations of the clinical approach to prevention and treatment of dental injuries

- High costs of treatment.
- Clinical time.
- Lack of clinical expertise.
- Poor treatment outcomes.
- Inequitable access to treatment and care.
- Palliative: fundamental causes of condition are not addressed.

Public health agenda

As the main causes of TDIs are linked to physical and social environment through falls, collisions, traffic injury, and violence, it should be very apparent that an upstream public health approach to prevention is of paramount importance. Indeed, in dentistry the prevention of TDI is probably the most obvious example where adopting a social determinants approach is an absolute necessity. Application of the principles and practice of the Ottawa Charter in the prevention of TDI should be a major priority. In addition to protecting and strengthening individual's ability to avoid dental injuries, public health action is needed to improve the physical and social environments associated with injury. For example, policies in schools, colleges, and other institutions that ensure all play and recreational facilities are designed and maintained to minimize injury are essential. Action to create a more supportive social environment is also needed. Measures to address bullying in schools and violence are therefore key actions to reduce TDIs. A good example of this is the comprehensive approach to reduce facial injury in south Wales instigated by an oral surgeon. Rather than only treat the victims of violence, a collaborative multi-agency strategy was adopted to address the links between violence

DISCUSSION POINTS 3

In a very deprived area of east London, the prevalence of traumatic dental injury amongst teenagers is higher than the average UK figure. As a public health dentist working in that area you are required to develop a public health strategy to combat this problem. Consider the following points.

- What factors within the area may be responsible for the high prevalence of dental injury?
- Describe the different agencies, sectors, and organizations that you would need to work with to successfully tackle this problem.
- Outline what actions you would recommend to reduce the prevalence of dental injury within the school population.
- How would you evaluate your recommended actions?

and alcohol (Shepherd 2007). This involved working with the police, NHS staff, local authorities, and the judiciary on a range of policies to reduce excess alcohol intake and violence on the streets of Cardiff.

Conclusion

Available epidemiological evidence indicates that traumatic dental injury is a significant public health problem. Conventional preventive and treatment approaches are unlikely to be successful unless a complementary public health strategy is adopted. Effective public health action will require collaborative working across sectors to alter the social, economic, and environmental conditions that are linked to dental injury.

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16 Prevention for people with disabilities and vulnerable groups

CHAPTER CONTENTS

Introduction

Principles of prevention for people with disabilities and vulnerable groups

Prevention of oral disease in people with disabilities and vulnerable groups: some examples

Conclusion

References

Further reading

Useful websites

By the end of this chapter you should be able to:

- Describe the characteristics of and need for prevention in people with disabilities and vulnerable groups.
- Understand the principles of prevention for people with disability and vulnerable groups.
- Outline the supportive role of health and social networks in prevention for people with disability and vulnerable groups.

The chapter links with:

- Determinants of health (Chapter 2).
- Overview of epidemiology (Chapter 5).
- Principles of oral health promotion and planning dental services (Chapters 8 and 21).
- Problems with health services (Chapter 23).

Introduction

In this chapter we will look briefly at the prevention needs of people with disabilities and people who are vulnerable and require special care dental services for reasons that may be social. Within this group there will be a spectrum of people with needs and dependencies. Not everyone described as belonging to a vulnerable group in this chapter would identify themselves as disabled; nevertheless, what they have in common are a range of factors that put their oral health at risk, make accessing dental care complicated, or make the provision of dental care complicated. These factors may include a 'physical, sensory, intellectual, mental, medical, emotional or social impairment or disability, or more often a combination of these factors' (GDC 2012).

People with disabilities have fewer teeth, more untreated disease, and more periodontal disease when compared to the general population in the UK

(Department of Health 2007). Good oral health can contribute to better communication, nutrition, self-esteem, and reduction in pain and discomfort, while poor oral health can lead to pain, discomfort, communication difficulties, nutritional problems, and social exclusion (Department of Health 2007). As discussed in previous chapters, the important risk factors for oral diseases include: high-sugar diets, poor oral hygiene, smoking, and alcohol misuse. They are also shared risk factors for chronic non-communicable diseases such as respiratory diseases, cardiovascular diseases, diabetes, and cancers. The basic principles and approaches for the prevention of oral diseases in disabled people and vulnerable groups are similar to those described in previous chapters; however, there is a need to recognize that the context, the circumstances, the settings, and the opportunities for prevention will be slightly different, depending on the groups. For example, some disabled people (e.g. people with learning disabilities) may be reliant on others, such as family, carers, health care workers, to support basic self-care and to access health services. Other vulnerable groups such as homeless people live independent lives but lack access to basic facilities such as drinking water, and a place to store toothbrushes and toothpaste. So, in designing interventions to promote oral health that are specific and appropriate, it is important to be aware of the context, settings, and circumstances in which some individuals and groups live. These bigger influences will affect the choices people can make and the options available to them. Interventions must not only be limited to intermediate factors such as health behaviours, but also include action at policy level to address social and political determinants of health (Watt and Sheiham 2012).

DISCUSSION POINTS 1

What do you think are the main oral health messages you would give to one of your patients who is the mother of a 2-year-old child with Down's syndrome? She has asked your advice about when she should take her young son to the dentist.

Principles of prevention for people with disabilities and vulnerable groups

People living with disabilities and people in vulnerable groups (e.g. homeless people and frail community-dwelling older people) share common characteristics in that they are *at risk* from oral disease, and face barriers to maintaining their oral health and accessing dental care. They also are more likely to be at the lower end of the social gradient. The first two principles underpinning prevention for people with disabilities and vulnerable groups must therefore address inequality (Department of Health 2007):

- 1 People with disabilities or other vulnerabilities share the same entitlement to good oral health as the rest of society.
- 2 They also share the right to a responsive oral health care service.

This means that for people with disabilities and other vulnerabilities, additional action and support will be required to overcome barriers. This will necessitate oral health becoming integrated into health and social policy at all levels. A key UK document *Valuing People's Oral Health* (Department of Health 2007) provides comprehensive overarching guidance on how this integration might be achieved for the prevention of oral disease in people with disabilities. Box 16.1 summarizes this general guidance. While this guidance was developed specifically for people with disabilities, the principles are also appropriate to guide prevention of oral diseases in vulnerable groups.

The focus of *Valuing People's Oral Health* is predominantly on intermediate factors such as oral health behaviours, health services, and psychosocial support. However, it must be remembered that people with disabilities and vulnerable groups also find themselves at the lower end of the social gradient because of political and social drivers, such as the social and welfare policy in a country. These political and social determinants mean that people who are disabled are far more likely to have lower or no

Box 16.1 Integrating oral health into the general health agenda**Assess oral health needs**

- Assess oral health needs of disabled children and adults, preferably in line with local surveys of oral health. Disseminate findings to local health and social care networks and use information to inform planning and actions in relation to preventing oral diseases.

Design and implement effective preventive actions and programmes

- It is important that disabled people, vulnerable groups, parents and carers, health care workers, and social care workers have access to correct information, advice, and support in relation to oral health issues.
- Programmes should be evidence based and interventions based on psychological theories of behaviour change.

Ensure consistency of messages across all health and social care sectors

- All groups involved in the care of disabled and vulnerable people should receive the same consistent oral health information.
- The help of national support groups should be enlisted to disseminate consistent oral health messages and to keep messages up to date.

Build competence through training and sharing of knowledge

- It is important that parents and carers, health care workers, and social care workers receive the appropriate training to enable them to give consistent and correct oral health advice and to direct people to appropriate dental care services.

Ensure oral health is part of every care plan

- Oral health care plans should be fully integrated into children's and adults' health care plans, and should be audited on a regular basis.
- Local oral health champions should be appointed to ensure systems and processes are in place to ensure oral health care is integrated into health care plans and people in need of dental care are directed to appropriate providers.

Commission appropriate responsive dental services as necessary

Modified from Department of Health (2007) Valuing people's oral health: a good practice guide for improving the oral health of disabled children and adults. London: Department of Health, TSO.

academic qualifications, they are more likely to be unemployed, to be reliant on welfare and benefits (over 45% of disabled people live in poverty), to be living in social and segregated housing, to have poorer health, and to be less able to participate in community life (Larkin 2011). Efforts to address health and oral health inequality should address intermediate determinants, but action must also be directed at structural determinants to address persistent inequality. More equal societies create better conditions for health and oral health (Watt and Sheiham 2012). In the following sections we shall provide some examples of approaches to prevention of oral disease in people with disabilities and other vulnerabilities.

Prevention of oral disease in people with disabilities and vulnerable groups: some examples

People with learning disabilities

Learning disability has been defined as 'a significant impairment of intelligence and social functioning acquired before adulthood' (Lindsey 1998). People with a learning disability have a significantly reduced ability to understand new and complex information, to learn new skills, and to cope independently. The

impairment in intelligence and social functioning will have begun in childhood and have a lasting effect on development (Department of Health 2001). See Box 16.2.

In countries other than the UK, the term ‘intellectual disability’ is used and should be considered interchangeable with the UK term ‘learning disabilities’ (Emerson and Heslop 2010). In the UK it is estimated that there are 1.2 million people with a mild to moderate learning disability and approximately 210,000 with a profound disability (Department of Health 2001). There has been an increase in the learning disabled population since the beginning of the last century, reputed to have been achieved by improved infant mortality and improvements in health and social care. People with learning disabilities, particularly those with Down’s syndrome, are also surviving into older age. It is predicted that there will be a 36% increase in the population with learning disability between 2001 and 2021 in the UK (Department of Health 2001). People with learning disabilities have poorer health than the rest of the population, and those from less advantaged backgrounds are more likely to suffer from more severe problems and to die earlier (Hollins *et al.* 1998; Mencap 2004; Micheal 2008). See Box 16.3 for a summary of prevalence of health issues experienced. Crawley (2007) found that people with learning disability are more likely to eat a poor diet and to be overweight compared to the general population. In addition,

Box 16.2 Learning disability: measures of impairment and impact on social functioning

Learning disability is often measured using the Wechsler Adult Intelligence Scale (Wechsler 1955): the mean of the scale is 100. The general scale is used as follows:

Mild disability	50–70
Moderate disability	35–50
Severe disability	25–35
Profound disability	Less than 20

Source: Bild (2012). <http://www.bild.org.uk/information/factsheets/>. Accessed 9 April 2013.

inadequate nutrition and over-nutrition are often poorly recognized by support staff and carers. Many people with learning disabilities live unhealthy lifestyles and live sedentary lives. They are often dependent on others to ensure exercise and leisure activities.

Anders and Davis (2010) suggest that while rates of dental caries and periodontal disease are similar to the general population, adults with a learning disability have poorer oral health, poorer oral hygiene, more untreated periodontal disease, and experience poorer oral health outcomes (e.g. more extractions and fewer teeth) compared to the general population. They also suggest that people with Down’s syndrome and those less able to cooperate with routine care are at greater risk from oral disease. The reasons why people with learning disability have poorer oral health outcomes compared to the general population are complex, but a significant proportion of the problem relates to the difficulties they face in accessing preventive advice and appropriate dental care. It is suggested that there is a low priority for oral health and low oral health literacy amongst carers of people with learning disabilities

Box 16.3 People with a learning disability:

- are three times more likely to die from a respiratory disease;
- have a higher risk of coronary disease compared to the general population;
- have a higher risk of gastro-intestinal diseases and cancers;
- have a greater prevalence of epilepsy (32% compared to only 1% of the general population);
- have a greater prevalence of dementia (22% compared to 6% of the general population). People with Down’s syndrome are also at greater risk of early onset;
- have a greater prevalence of schizophrenia (3% compared to 1% of the adult population);
- are more likely to have problems with their mental health, with one in three experiencing a problem at some stage.

Source: Mencap (2004). *Treat me right! Better healthcare for people with a learning disability.* www.mencap.org.uk/sites/default/files/documents/2008-3/treat_me_right.pdf. Accessed 23 June 2012.

(British Society for Disability and Oral Health and the Faculty of Dental Surgery 2012). This is joined by a lack of ability to express need, to undertake self-care (Kendall 1992), and reluctance by some dentists to treat people with learning disabilities (British Society for Disability and Oral Health and the Faculty of Dental Surgery 2012). People with learning disabilities may also experience physical barriers to accessing care (e.g. they may be physically impaired or have no access to transport) and cultural barriers to accessing care (e.g. women from ethnic minorities may prefer to see a woman dentist). There has also been a dramatic change in the philosophy of provision of care for people with learning disabilities, with many now living in their own home where their rights to independence and to achieve their full potential is emphasized (Sperlinger 1997). The move away from a medical model of disability to the social model has meant that there has been a decline in emphasis on health (Band 1998). Paradoxically, it has now become more difficult to ensure that people with a learning disability are being supported by and have access to medical and dental services.

The British Society for Disability and Oral Health and the Faculty of Dental Surgery (2012) have produced detailed guidelines for improving the oral health of people with learning disabilities through clinical guidelines and integrated care pathways. This guidance focuses on four stages of life: the pre-school child, school-age child, transition stage (adolescence to adulthood and parental care to community care), and young adults through to older people. This focus on the whole life course is important as it means that actions to improve oral health begin early in life and become established over the life of the individual. The key aspects of the guidance in relation to prevention of oral diseases are summarized in Box 16.4.

The approach presented in Box 16.4 is very much a focus on ensuring that the oral health needs of people with learning disabilities are fully described, that people can access evidence-based information to support oral health behaviours, and that they can access appropriate dental care when it is needed. The guidance advocates harnessing national support and interest groups in the cause of oral health. The guidance was produced as a complementary document to *Valuing*

People Now (Department of Health 2009, p. 10) which emphasizes action at governmental policy level to create equality for people with learning disabilities:

people with a learning disability are people first with the right to lead their lives like any others, with the same opportunities and responsibilities, and to be treated with the same dignity and respect. They and their families and carers are entitled to the same aspirations and life chances as other citizens.

Older people

For the purposes of this discussion, older people will be categorized as aged 65 and above. Older people represent a significant and growing proportion of the UK population and this trend is also seen in many other developed and developing countries. The dental needs of older people have changed considerably over the last 50 years. As outlined in Chapter 6, in parts of the UK, the extensive need for dentures is diminishing and individuals are retaining more of their teeth. But this means that they are now susceptible to tooth decay, root caries, gum disease, taste alteration, and tooth wear. People who are wearing partial dentures are also at risk of denture stomatitis and other conditions associated with poor denture hygiene. Many older people are on long-term medications which means they also tend to have dry mouths. Older people have more complex dental needs associated with heavily restored teeth combined with failing general health. Table 16.1 summarizes national data for England and Wales from the Adult Dental Health Survey (ADHS 2009) (Steele *et al.* 2011) in relation to the 65 to 84 age group. In the ADHS 2009, a complexity score was piloted that assessed the complexity of care required by a person based on existing disease, restorative treatment load, and quality of life. A score of three or above was considered to indicate a fair degree of complexity (Steele *et al.* 2011). According to this index, nearly a third of people aged over 65 have potentially complex dental needs. Poor oral health can have general health impacts in terms of aspiration pneumonia, malnutrition, weight loss, and

Box 16.4 Integrated care planning for people with learning disabilities**Pre-school child**

- The dental profession should advocate for and raise awareness of the dental needs of children with a learning disability amongst health and social care partners. Oral health should be integrated with the health and social care being provided to children and their families. Dentists should be included in the interdisciplinary team caring for newly diagnosed children and children receiving on-going care.
- The dental team should work with health and social care partners to identify early those children at particular risk from oral disease.
- Parents and carers and health care professionals should receive training to recognize symptoms that may have a dental cause, e.g. loss of appetite, irritability, self-harm, sleep disturbance.
- Parents and carers should be involved in the early implementation of preventive practices relating to dietary habits, use of fluorides, fissure sealants, and effective oral hygiene.
- The consumption of added sugars should be reduced, night-time bottles should be discontinued by 12 months, and any required dietary supplements should be given at mealtimes.
- Toothbrushing should be instituted as early as possible and mouth-care commenced in those who are tube fed.
- Toothbrushing should occur twice daily using a family-strength fluoridated toothpaste. It should be continued to be supervised beyond 8 years of age, depending on independence and manual dexterity.
- Mouth rinses are not recommended for children with swallowing difficulties.
- Regular dental attendance and a usual source of dental care is encouraged to reduce anxiety and get children used to going to the dentist.

The school-age child

- Screening is no longer carried out routinely in state and special schools in parts of the UK; therefore it is important that positive links are developed with state and special schools to ensure regular dental check-ups and dental attendance.
- Educational programmes should include oral hygiene in a child's educational plan.

- Healthy eating and snacking policies in the school environment should be supported.
- A careful assessment of a child's dental needs and ability to cooperate with dental care should be made. In order to minimize development of dental anxiety, dental teams should be trained in non-pharmacological behaviour management techniques, including desensitization and use of communication tools. Some children may require conscious sedation or general anesthesia (GA). GA should be used as a last resort when all other avenues have been exhausted (Department of Health 2000).
- Children with special care needs are considered a priority group for fissure sealants.
- Children with special care needs should receive orthodontic intervention in the developing dentition if this is clinically appropriate, but this must be balanced by an assessment of their capacity to cooperate and ability to undertake oral hygiene.

The transition stage (adolescence to adulthood, parental care to community care, changes in school, changes in personal development)

- At this time, the main emphasis is on oral health education, regular dental attendance, and a usual source of dental care. Children under the care of paediatric dentists should be transferred seamlessly to the special care dental service (often the local salaried and community dental service).
- Discharge and referral systems should be in place to allow continuity of dental care and support once adults leave secondary education and move into further education, work, or institutional care.
- Raise awareness with parents and carers of the need to maintain regular dental attendance preferably with a regular source of dental care.

Young adults through to older people

- As people with learning disabilities have taken up opportunities to continue education, to obtain employment, and to participate in leisure and day activities, it has become more challenging to provide dental care for this group. Sixty percent of adults will rely on a family member or a caregiver to access basic

health services (Mencap Information Services 2008). It is important that people moving on from education into adulthood do not get lost to follow-up.

- The dental team should work with health and social care partners to raise awareness of oral diseases; to raise awareness of symptoms that may have a dental cause, e.g. loss of appetite, irritability, self-harm, sleep disturbance; and support healthy eating, oral hygiene practices, and regular dental attendance.
- Oral health should be included and integrated into care plans and a dental champion appointed locally to ensure integration into processes and procedures.
- In cases where people are unable to consent for treatment and care, dentists must work together to understand duty of care and responsibility to provide care in a person's best interest (Lord Chancellor's Department 1999). Protocols should be in place to manage the situation when people refuse routine oral hygiene.

- For people with low support needs the emphasis is on helping people undertake effective oral hygiene, eat a healthy diet, and attend regularly for dental assessment and care. For people with medium and high support needs (who will be generally reliant on others for their support needs), the emphasis will be on helping people undertake effective oral hygiene and eat a healthy diet. Regular contact with the salaried/special care dental service is desirable to ensure access to dental care, including access to conscious sedation and GA if appropriate. GA should be used as a last resort when all other avenues have been exhausted (Department of Health 2000).

Modified from British Society of Disability and Oral Health and the Faculty of Dental Surgery (2012). *Clinical guidelines and integrated care pathways for the oral health care of people with learning disabilities*. Faculty of Dental Surgery, The Royal College of Surgeons in England; and Department of Health (2007). *Valuing people's oral health: a good practice guide for improving the oral health of disabled children and adults*. London, Department of Health, TSO.

Table 16.1 Oral health of older people aged 65–84 years

Condition	All (16 plus)	65–74	75–84
Edentulous	6%	15%	30%
Mean number of sound teeth	17.9	10.5	6.8
Proportion with decayed teeth and roots	31%	27%	33%
Mean number of decayed teeth and roots	0.8	0.8	0.9
Mean number of teeth with exposed vulnerable roots (at risk from root decay)	7.3	11.8	
Proportion with active root decay	7%	10%	20%
Tooth wear (severe)	2%	4%	6%
Presence of partial dentures	9%	21%	38%
Periodontal disease (pocketing greater than 6 mm)	8%	14%	14%
21 or more teeth present in the mouth	86%	61%	40%
Complexity score (3 or more)	19%	32%	35%

Source: Steele *et al.* 2011.

exacerbation of existing health conditions due to chronic dental infection, which complicates the management of systemic conditions.

The potential negative impact of oral health on general health and quality of life is an important public health issue. It is important therefore to minimize dental disease for older people, particularly in the light of failing health, which would make dental care complicated. It is also important that older people have early and timely dental care to ensure that dental need is less complicated to treat and manage. The approaches to addressing the prevention needs of older people will depend on the setting; many older people continue to live in their own homes, sometimes with support from health and welfare services. Other older people who are functionally dependent and rely on others for many of their basic needs will be in more supported residential care.

Older people in residential care

Older people residing in residential care have a high risk of oral disease, and there is a multiplicity of evidence that this is directly linked to oral care and poor oral hygiene (De Visschere 2011). This has a significant impact on people's quality of life in terms of communication, function, and nutrition. Institutional barriers to undertaking oral care have been reported at a number of levels and are summarized in Box 16.5.

Guidance on supporting prevention of dental disease in older people tends to use the settings approach of the residential care home and focuses on supporting changes in oral health care by training nurses and carers to examine the mouth, undertake oral hygiene procedures, and enable older people to access dental care if they need to (Nicol *et al.* 2005). One such approach is the Australian Government, Department of Health and Aging *Better Oral Health in Residential Care* (2009). The core components are summarized in Box 16.6. In this approach, four key processes are instituted to ensure oral health. The whole care team, including doctors, nurses, health care workers, and dentists, are involved in delivering the intervention.

A number of reviews have been reported on the best approach to use in promoting oral health in care homes, but the evidence base remains patchy. There is

Box 16.5 Institutional barriers to the practice of oral health care in residential care settings

Individual level barriers: number of natural teeth remaining, extent of functional dependence, level of cooperation, and low demand for dental care.

Nursing and care staff barriers: unawareness of importance of oral health, lack of appropriate training, knowledge, and skills, low priority given to oral health, and dislike of undertaking oral hygiene procedures in the mouth. Concerns over consent issues.

Organizational barriers: lack of time, heavy workloads, staff turnover, increasing frailty and dependence of some older people, and absence of a structured health policy.

(Modified from De Visschere, L., de Baat, C., Schols, J.M.G.A. (2011). Evaluation of the implementation of an 'oral hygiene protocol' in nursing homes: a 5 year longitudinal study. *Community Dent Oral Epidemiology*, **39**, 416–25.)

mixed evidence that training of carers can lead to improvements in oral care procedures, and while improvements in denture hygiene tend to improve over the long term, sustained improvements in plaque scores and gingival status are not sustained over the long term (Valle-Jones 2012).

DISCUSSION POINTS 2

Is the oral health of older people a public health problem? Use Chapters 1, 8, and 17 to help plan your answer.

Community-dwelling older people

Most older people live in their own homes, and some may receive support to assist independent living, such as personal care services. Personal care services could include help with dressing, eating, toileting, and personal hygiene including oral hygiene. Regardless of support needs, effective oral hygiene and access to timely dental care are important for older people as they age. Older people and their carers may not be aware of changes and deterioration in oral

Box 16.6 A model to improve oral health in residential care settings

Oral health needs assessment: all residents on admission should receive an assessment that includes an oral examination of the mouth. This can be undertaken by a dentist or a suitably trained nurse. A previous training package for nurses enables them to recognize commonly occurring mouth conditions.

Oral health care plan: all residents will have an oral health care plan developed by their nursing lead that is based on a simple protection regime. This involves instructions and guidance on brushing of teeth, cleaning of dentures, prevention of gingivitis, relief of dry mouth, diet advice to prevent dental decay, use of toothpastes and chlorhexidine gels, management of bleeding gums and dry mouth, and sore dentures.

Daily oral hygiene: nurses and care staff undertake daily oral hygiene procedures and this is recorded in a daily record.

Dental treatment: the need for dental treatment will be assessed at the initial assessment and arrangements made for referral for dental care. Referral forms include consent for dental examination and treatment, and details of medical history, medications, and known allergies. Dental services may have to be brought to the residential care home via domiciliary care or mobile dental services.

(Modified from Australian Government, Department of Health and Aging (2009). *Better oral health in residential care: professional portfolio, oral health assessment toolkit for older people*. Oral Health Care Planning Guidelines, Dental Referral Protocol. South Australian Dental Service.)

health. Indeed, many older people think a decline in oral health and tooth loss is an inevitable part of aging. Some older people may be surviving on low incomes and dental care costs are perceived to be high. There is a clear need to raise awareness of oral health amongst carers of older people in community settings. There are also training needs in relation to: care of the mouth, management of mouth symptoms such as dry mouth and ulcers, and availability of and referral to local dental care providers. Box 16.7 outlines some of the key principles involved in promoting oral health in community-dwelling older people.

DISCUSSION POINTS 3

You have recently taken up a post in a busy high-street dental practice. You have just been on a domiciliary visit to an older lady in a local private residential care home who has lost her partial denture. She is a long-term patient of the practice but has recently moved to the care home because she has become physically frail and functionally dependent. She has lost her partial denture twice in the last year and her oral hygiene was poor when you examined her. What advice will you give her carers about her mouth care? What other enquiries might you make about mouth care in general at the care home?

Homeless people

Most current definitions of homelessness recognize a broad range of circumstances that could be described as homelessness. They include rough sleeping, use of hostels and night shelters, B+B accommodation, and squatting. Other forms of accommodation could include 'short-life' accommodation and sleeping on friends' floors. The key characteristic is that people have insecure housing and are threatened with or are already homeless. Resettlement work with homeless people is unstable and there is a *revolving door* phenomenon where people are rehoused and then relapse into homelessness. Thus some people have a homeless 'career' (Fitzpatrick *et al.* 2001) where they move through a range of housing situations. This may be because the circumstances that made them homeless have not been addressed, or the issues are intractable, or they have been housed far away from friends and support networks. Research suggests that homeless people have poorer mental and physical health and tend to die younger when compared with housed people (Balazs 1993; Pleace *et al.* 2000). In the UK, studies of the oral health of homeless people suggest that while oral health is similar to the general population, unmet dental needs are high and oral health-related quality of life is reduced (Daly 2009, 2010). Homeless people live stressful lives in

Box 16.7 A model to improve oral health of older people in community settings**Appoint a champion for oral health locally**

It is important that a local champion for oral health works with health and social care partners to raise awareness of oral health, to ensure oral health becomes part of the overall health and social care assessment, and to ensure that the training of all people in front-line contact with older people living in community settings includes oral health as a priority.

Joint working with health and social care partners

It is important that older people, carers, health care workers, and social care workers have access to correct information, advice, and support in relation to oral health issues. This will involve dissemination across health and social care boundaries, but should also include out-patient departments, A&E departments, and local community pharmacies.

Joint health, social, and housing needs assessment

When a person first comes into contact with social services and is referred for a joint health and social assessment it is important that he/she receives an oral health assessment, which should include an examination of the mouth by a dentist or a carer trained to recognize common oral conditions.

Design and implement effective preventive actions and programmes

Programmes should be evidence based.

Ensure consistency of messages across all health and social care sectors

All groups involved in the care of older people should receive the same consistent oral health information.

Build competence through training and sharing of knowledge

It is important that carers, health care workers, and social care workers receive the appropriate training to enable them to give consistent and correct oral health advice and to direct people to appropriate dental care services.

Ensure oral health is part of every care plan

For those providing personal services to older people, oral health care plans should be fully integrated into care plans, and should be audited on a regular basis. Oral care should include instructions and guidance on brushing of teeth, cleaning of dentures, prevention of gingivitis, relief of dry mouth, diet advice to prevent dental decay, use of toothpastes and chlorhexidine gels, and management of bleeding gums, dry mouth, sore dentures.

Commission appropriate responsive dental services as appropriate

This could include local dental practices, providing domiciliary dental care, mobile dental services, and special care dental services.

(Based on Department of Health (2007) *Valuing people's oral health: a good practice guide for improving the oral health of disabled children and adults*. London, Department of Health, TSO.)

temporary and unsanitary conditions, have inadequate nutrition, and poor access to hygiene and washing facilities. Small problems become major problems because they lack access to basic hygiene and shelter to undertake self-care (Balazs 1993). In the UK, barriers to dental care have been described as: low perception of dental need amongst homeless people, lack of awareness of local dental services, dental anxiety, and a perception amongst homeless people that they would be unwelcome at a dental surgery (British Dental Association 2003). While homelessness is not a *cause* of poor health, it does create an increased risk for poor health

because of increased exposure to risk factors (Quilgars and Pleace 2003). These factors include stress, poor nutrition, poor living conditions, poor hygiene, smoking, alcohol and drug use, accidents, and inadequate facilities for self-care (Fisher and Collins 1993). Managing the reduction of these risk factors in homeless people requires a common risk factor approach and sensitivity to the fact that general health may be poor and people may have little control over when and what they eat, have limited access to washing facilities, and smoking and alcohol use may be endemic. Approaches to prevention in homeless people must be sensitive to their context

Box 16.8 A model to improve oral health of homeless people**People who are rough sleeping or in very unstable accommodation**

For people whose housing situation is unstable, the conditions may not be right for them to plan for and undertake long-term change in oral health behaviours. At this point, it is important to raise awareness about oral health, how to keep their mouth clean, and raise awareness about smoking, drugs, and alcohol effects on oral health. Signpost to sympathetic local providers of dental care, and signpost to local health and social support if they are not already in contact with agencies, or request advice on dependency issues. Rough-sleeping people should receive an oral hygiene pack consisting of toothbrush and family-strength fluoridated toothpaste.

People who are in more stable accommodation, such as hostels

People may now have the space to think about their lives and things that they might want to change. More formal

approaches to oral health promotion may now be instituted based on a common risk factor approach in relation to diet, smoking, alcohol use, and drug use. At this time, improvement in appearance including oral appearance is an important element of the trajectory back into a housed life. Key principles of joint working with health and social care partners will be:

- appointing a champion for oral health to liaise with health and social care partners;
- oral health needs assessment and signposting to long-term provider of dental care, i.e. a regular source of dental care;
- consistent and evidence-based oral health information and training as appropriate;
- ensuring that oral health is part of health and social care plans;
- commissioning 'safety net' dental services for rough sleepers and individuals who cannot yet use mainstream dental services.

and circumstances. The chaotic life of a rough sleeper is not the best situation for an individual to contemplate behaviour change. Many will be struggling with dual or even triple dependencies and may not be receptive to exhortations to brush their teeth twice a day, while also trying to cope with an alcohol problem. Box 16.8 summarizes some of the key issues to consider.

Conclusion

In this chapter we have briefly reviewed the principles of oral health promotion for people with disabilities and vulnerable groups. The importance of working closely with health and social care partners was emphasized, particularly in relation to getting consistent and evidence-based information about the mouth to non-dental colleagues working with vulnerable groups and people with disabilities. While most of the approaches will be similar, it is important that interventions are tailored to circumstances, context, and settings. Much of what was presented in this chapter

was related to intermediate determinants of health; in order to address persistent inequalities, action must also be directed at higher-level structural determinants, such as social and welfare policy.

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British Society for Disability and Oral Health: <http://www.bsdh.org.uk/index.php>. To access a range of guidelines for people with disabilities: <http://www.bsdh.org.uk/guidelines.html>.

British Society of Gerodontology, to access guidelines on care of older people: <http://www.gerodontology.com/guidelines.html>.

International Association for Disability and Oral Health: <http://www.iadh.org/>.

Special Care Dentistry Association: <http://www.scdonline.org/>.

4 Health services

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17 Overview of health care systems

CHAPTER CONTENTS

Introduction

Background

Factors influencing development of modern health care systems

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What is a high-performing health care system?

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Further reading

By the end of this chapter you should be able to:

- Outline the range of factors that influence the development of health care systems.
- Describe the different components of a health care system.
- Outline criteria by which health care systems could be evaluated.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- All the other chapters in this section (Chapters 18–23).

Introduction

The World Health Organization defines a health care system as:

all organizations, people and actions whose primary intent is to promote, restore or maintain health. This includes efforts to influence determinants of health as well as more direct health-improving activities.

(WHO 2007)

Such a definition covers a myriad of potential elements and factors, of which the dental element is but one. A health care system is not static: it evolves as part of the more general social and welfare arrangements in a society. As a member of a health care profession, all dental care providers need to have an appreciation of the wider aspects of any arrangements of health, its determinants, and care delivery, if only to understand how the pressures on a system may impact on their current and future activities.

This chapter provides an overview of health care systems and provides the framework for Chapters 18–23. Health care systems are complex organizations that are in a constant process of change and evolution. Dentistry is one very small component of the wider health care system, which is itself part of the overall social welfare system within society. Dentists, as health professionals, need to understand the basic elements of the health care system within which they are working.

Background

The development of health care systems is an on-going process in which all societies try to meet the health needs of its citizens. There is no society that

has yet designed a system that meets the needs of all its citizens. Indeed, historically in many countries it was only the wealthy that were able to access health care in a society. As societies evolved, the pressures to make the health care system accessible to all its members grew. Mays (1991) has highlighted the political importance of health care, showing that many health care systems reforms were designed to prevent political instability and improve the fitness of army recruits. Indeed, the development of the then School Dental Service in the UK was brought about following questions in Parliament about the poor state of soldiers' teeth in the Boer War.

Health needs change. Other important factors that influence the nature, extent, and shape of a health care system include the demographics of a society (which have an impact on the nature of the health problems); advances in technology; expectations; and a country's economic wealth. Modern health care systems and the health professions providing care within them have a long history of evolution and development. Across the world, different systems of health care have emerged, linked to the social and political changes within each country.

The political importance of health cannot be overestimated. A former Chancellor of the Exchequer Nigel Lawson stated in his memoirs that 'The National Health Service is the closest thing the English have to a religion' (Lawson 1992), while in the USA the reform of the health care system was a key battleground of the 2012 Presidential election.

Health care systems largely reflect the values and priorities of the societies that they serve. In those societies in which there is a strong notion of individual responsibility, for example the USA, the individual is expected to take far greater responsibility for the funding of coverage and a *market-type* approach is used to drive standards and the qualities of care. Others, in which the state has taken a far more proactive role in safeguarding its citizens, for example Cuba and China, have adopted funding arrangements that rely on central sources and take a greater role in the planning arrangements.

Factors influencing development of modern health care systems

As mentioned earlier in this chapter, health care systems are not static entities but change over time to address changing political and social imperatives as well as the health problems they were designed to deal with. Box 17.1 presents a number of key factors that have influenced how health care systems have developed.

Over the last 100 years, the life expectancy of the British population increased from below 50 years at the turn of the 20th century to nearly 76 by its end. Over the same period, the population expanded from 38.3 million to 59 million. The impact of these changes is considerable: more people seek health care and the nature of the care required has changed. The conditions that a care system has had to deal with have altered. Conditions now tend to be more chronic and non-communicable in nature compared to predominantly acute infections in the early part of the century. For example, the prevalence of deaths from infections among children aged 5–9 over the period 1911–1915 was 50%. In the late 19th century, over 80,000 people died from tuberculosis; in 1997 the number was 440 (Hicks and Allen 1999). The common health problems now facing the western world are chronic non-communicable diseases such as diabetes, heart disease, and arthritis. Health care systems have had to evolve from managing infectious diseases to dealing with chronic conditions, in which the emphasis lies equally with care and improving the qualities of life.

Box 17.1 Factors influencing the development of health care systems

- Changing demographics of the population
- Evolving patterns of disease and their impacts
- Expectations and demands of the public
- Technology
- Globalization
- Economy

Peoples' expectations have also risen over this period (Sixma *et al.* 1998). No longer are people willing to be totally subservient to the health professions; rather they expect to be involved in decisions about the care they receive. People now have far greater access to information through the World Wide Web, although whether they are able to judge the quality of the information is contested. Technology continues to advance, providing a host of new care modalities: the incidence of preterm babies is currently about 8%, and while there has been an increase in survival rates of babies born prematurely, there is an accompanying high level of disability, which makes resource demands.

With the advent of cheap travel, people are now seeking care in differing countries; a number of Primary Care Trusts in the south of England have contracts with French hospitals. Health care is not confined to a single country but has become part of a global industry. Perhaps not least of all, these changes have considerable impact on the costs of health care and, as the economies of countries face increasing pressures, so too does the health sector.

These pressures force politicians to seek differing solutions to the provision of care. For example, while technology may drive the skill mix blend of health professionals in one direction through specialization, governments seek to introduce lower grades of workers or ask existing grades to undertake more demanding tasks.

DISCUSSION POINTS 1

How might the factors identified in the section **Factors influencing development of modern health care systems** influence the pressures on and the subsequent direction that the dental care system might take?

Components of health care systems

Gift and Andersen (2007) suggest that health care systems can be divided into a number of aspects. These are:

- Structure: how the system is structured.
- Functions: what the system set out to achieve.

- Personnel: who delivers the work.
- Funding: where the funds are derived from.
- Reimbursement: how workers are paid.
- Target population: which groups are prioritized.

Structure

The structure of the system is one of the most complex and dynamic aspects of a health care system. The majority of systems have three levels: primary, secondary, and tertiary. The primary level is normally the first point of contact between an individual and the health care system. General Medical Practitioners (GMPs), nurses, pharmacists, and General Dental Practitioners (GDPs) are all regarded as part of the primary care workforce.

The secondary level is normally where more specialized care workers operate and diagnostic services tend to be available. The Consultant grades are normally found at this level, although there have been a number of attempts to move much of the care provided into a primary care setting.

The tertiary level is where centres of excellence, especially that involving multi-disciplinary activity, occur. These centres tend to play a major role in teaching and training as well as research.

The NHS is structured in such a manner that, prior to accessing specialized care, an individual has to see someone in the primary care sector. Except for unusual and acute problems, such as accidents and emergencies, an individual needs to be referred to the specialist. This is not the case for all care systems. In France, for example, an individual can access a specialist without being referred.

The delivery of health services is not confined to surgeries or hospitals. There are numerous premises where advice, support, specific tests, or indeed care can be provided. For example, the workplace provides opportunities for individuals to be screened or offered health promotion advice, with a growing number of mobile services offering diagnostics services such as breast cancer screening and even minor surgical procedures. Besides economic arguments, a strong influence in

such developments was Julian Tudor-Hart (1971), who coined the term *the inverse care law*. In his seminal paper, he suggested that sites for health care delivery were often located in areas where needs were low.

DISCUSSION POINTS 2

Where are dental practices located in your area and how do you think this matches with where patients with the highest clinical levels of disease live?

Functions

Traditionally, health care systems have been orientated towards the delivery of treatments to individuals who have presented themselves with a perceived problem—the downstream approach to health care. With the recognition of the need to tackle the determinants of health, systems have moved towards a more preventive approach—the upstream model. This has considerable implications for the functions of a delivery system and has seen a growing emphasis on health promoting activities and earlier interventions based in the community. For example, mother and baby clinics held in community centres provide the opportunity to give advice on a range of health conditions as well as advice on nutrition and hygiene. While a health care system's activities continue to be dominated by the provision of treatments, examples of other functions that exist include health promotion, epidemiology, research, and training.

Personnel

A care system requires a number of differing personnel to achieve its goals; indeed, personnel costs for the majority of care systems is the biggest single item of expenditure. Currently, the NHS to curtail this have included the adoption of differing skills mixes to deliver care. However, clinicians only form one group of staff; technicians are required to handle the complex machinery involved in many aspects of advanced care, administrative staff to handle booking systems and finance, and managerial staff, as well as catering staff, porters, and cleaners, many of whom are poorly paid.

As with many jobs, there has been a move to professionalize the activities of workers. Friedson (1970) argued that there was a specific set of characteristics that defined the professions. These are as follows:

- The tasks undertaken by the workforce are highly skilled and require specialized knowledge.
- A worker needs to be on a register, allowing a monopoly to exist.
- The worker has considerable autonomy and, for some professions, their professional body is self-regulating.
- A code of practice exists that is designed to prevent malpractice and exploitation of the public.
- The rewards of a profession can be counted in both financial and status terms and tend to be associated with the higher social strata in a society.

Funding

Spending on health care has risen steadily for nearly all countries for many years. This increase and, perhaps more importantly, its percentage of the wealth of a country that is allocated to health care has given rise to concerns about its sustainability. When combined with the global economic downturn seen in the early 1990s, nearly all countries have been looking for mechanisms to control, if not reduce expenditure.

Table 17.1 shows the changes in health care expenditure between 1990 and 2010 for four countries in terms of percentage of GDP, spending per individual, and percentage paid by government. Not only has the percentage increased substantially overall, with the USA now spending nearly 20% of all its wealth on health care, but also so has the percentage paid by government. Even in a so-called private health care system such as exists in the USA, the public sector now contributes nearly 50% of the total cost.

Table 17.2 shows the changes in expenditure on health care in the UK between 1997 and 2010, as well as the annual rate of growth. Expenditure rose from £55 billion to over £140 billion over this period, with a mean rate of growth of 7.5%. This figure is now comparable to the European Union average.

Table 17.1 Total expenditure per person, percentage public expenditure, and percentage of GDP for four OECD countries, 1990–2010

	Total expenditure per person (US\$)		Public expenditure on health (percentage of total)		Percentage of GDP	
	1990	2010	1990	2010	1990	2010
UK	960	3,433	83.6	83.2	5.9	9.6
France	1,444	3,974	76.6	77.0	8.4	11.6
USA	2,851	8,233	39.4	48.2	12.4	17.6
Switzerland	2,030	5,270	52.4	65.2	8.2	11.4

(OECD health database. Accessed August 2012.)

Table 17.2 Spending on and annual growth rate of health care in the UK, 1997–2010

	Expenditure (£ billion)	Annual growth rate (%)
1997	55.0	
1998	58.7	6.7
1999	64.2	9.4
2000	68.7	7.0
2001	74.2	8.0
2002	81.4	9.8
2003	88.6	8.8
2004	96.2	8.5
2005	103.4	7.5
2006	112.4	8.7
2007	119.2	6.0
2008	125.6	5.4
2009	136.6	8.8
2010	140.8	3.1
Mean annual growth rate		7.5

Source: Office for National Statistics.

The funds for health care provision are in general derived from three main sources: taxation (either general or what is known as hypothecated, in which a specific sum is marked for health care), insurance (either compulsory, as in many EU countries, or voluntary), and out-of-pocket payments.

Out-of-pocket payments are of growing importance and are formed of three types:

- **Deductibles:** a certain amount of the initial cost is paid by the person before an insurance plan pays any benefits. A deductible may have to be paid only once during a given time (usually yearly) or each time certain services are provided.
- **Copayments:** part of the cost of each service provided is usually paid by the person. A copayment may be a fixed amount or a percentage of the cost.
- **Costs that exceed those covered by a plan:** plans may limit what they will pay for a given service (called the allowable amount). If a practitioner charges more than this limit, the person must pay it. Sometimes the limit is based on what the plan defines as usual, customary, and reasonable for a given service. Sometimes plans set a relatively low limit (which means people are likely to have to pay extra charges). However, often people pay extra charges only if the service is provided by a practitioner outside the plan's network, because practitioners in the network have

agreed not to charge more than the plan allows them to. Thus, people can usually avoid the extra charges by using practitioners in the network.

Reimbursement

Following the pooling of resources to fund a care system, the subsequent issue is how to distribute them. There are numerous possibilities, all of which use a single or combination of four mechanisms. The four mechanisms are:

- **Fee-for-service:** in which a care provider is paid for each item of care delivered to an individual or group, for example a type of filling, oral health promotion advice, or a scale and polish. This mechanism is the most widely adopted arrangement in the world in dentistry.
- **Capitation:** the payment to the care provider is linked to individual patients, in which the larger the number of patients that a care provider has, the larger their income. Capitation can be either weighted or unweighted. If weighted, differing patients have differing payments attached to them based on their risk status, usually past disease experience but this may include age, social, or behavioural factors. With unweighted capitation, every individual has the same financial component.
- **Diagnostic-related-payment:** the payment to the care provider is linked to the condition that the patient has and can be modified by the clinical characteristics, i.e. whether the patient has any comorbidities. This arrangement has only had, to date, very limited use in dentistry, not least because the payment system tends to be used in secondary as opposed to primary care.
- **Salaried:** the care provider is paid at a set rate for working for an employer. This arrangement is usually based around an annual salary, but a modification can include one where an individual is paid a sessional rate that can vary according to the type of session, for example an endodontic session or an oral surgery session.

Each of the arrangements has advantages and disadvantages (see Chapter 18), and within any health

care system, a variety of reimbursement arrangements will exist, even to an individual care provider. Such arrangements are known as blended systems and are becoming more widely adopted.

Target population

As societies struggle to meet all the health needs of their citizens, planners of care systems can prioritize care provision. This can be based on need or the identification of groups who are already marginalized or disadvantaged. The targeting can take a number of different forms. For example, in many countries older people may be exempt from charges, so reducing the cost barrier, or pregnant women who may be offered the opportunity for health promotional activities at antenatal classes to begin prevention of diseases as early as possible. Target populations vary from country to country, depending on their social and cultural histories.

Further examples of groups who are targeted are infants and nursing mothers using mother and baby groups, disadvantaged people, for example homeless people, and older people through services and support provided at day centres.

What is a high-performing health care system?

A number of authors have attempted to identify what is meant by a high-performing health care system. The viewpoints have varied considerably, some relying on specific definitions of key elements, for example waiting times, others on a more holistic approach, such as improved qualities of life. Arah *et al.* (2003) suggested that many countries have attempted to develop performance indicators to assess how well their particular system is performing. These could be categorized into a similar set of measures as suggested by Maxwell (1984) nearly 30 years ago:

- **Access:** ensuring that people have access to a comprehensive range of services in a timely and convenient manner.

- **Safety:** the risk of accidental injury or death due to medical care or medical error is minimized.
- **Health promotion:** the health system supports individuals to enable them to make positive decisions about their own health and helps them manage the impact of long-term conditions.
- **Clinical effectiveness:** the health system supports the delivery of interventions that improve health outcomes based on successful treatment, pain relief, the restoration of function, and care and support.
- **Patient experience:** the patients' experience includes the use of choice and their involvement in decision-making about the care they receive and ensuring that they are treated with dignity and respect.
- **Equity:** the system is equitably funded and resources are allocated fairly, based on the population's need for health care, and interventions contribute to reducing health inequalities.
- **Efficiency:** the system uses available resources to the maximum effect.
- **Accountability:** the system is able to demonstrate that it is achieving high standards of care by monitoring activities and taking into account the views of

patients, and where poor performing areas are identified, the failings are addressed.

Roberts *et al.* (2008) have suggested a modified version of these aspects and divided a health system into what they term *control knobs* and *intermediary performance measures* which have an impact on the *performance goals* (Figure 17.1).

Both intermediate measures of performance and the goals of a system can be modified, depending upon the political priorities, using the five elements within a system. Changing the financing, the routing of payments, a systems organization, its regulatory framework, and/or the behaviour of the workforce all impact on performance measures or goals. It is the job of the planners within the system to identify which of the *control knobs* provide better outputs and outcomes than currently exist.

DISCUSSION POINTS 3

- What are the strengths and weaknesses of the National Health Service?
- What measures could you use to compare the performance of the NHS against other health care systems?

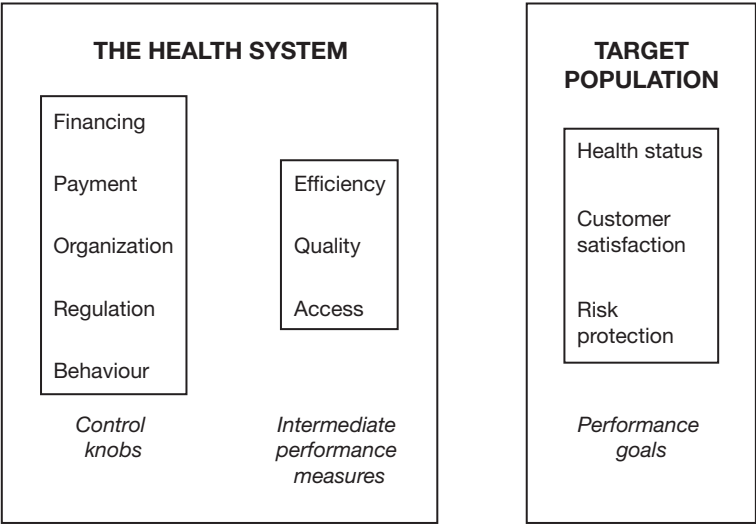


Figure 17.1 Assessing the performance of a health care system.
Reproduced from Roberts, M.J., Hsiao, W., Berman, P., Reich, M.R. *Getting Health Reform Right: A Guide to Improving Performance and Equity*, with permission from Oxford University Press.

Conclusion

A health care system is a continually evolving and complex set of arrangements based around three main agents: those delivering care, those receiving care, and those funding and managing it. While dental care tends to form only a small part of any system, the influence of the larger health system's arrangements and developments has considerable impact on it. Changes in policies on funding, workforce, and governance tend to apply equally to the dental system as to the health system. This chapter has identified the key components and issues facing all health care systems, and the issues will be expanded on in subsequent chapters.

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18 The structure of the NHS in the UK

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Outline of the structure

Funding

Major influences over the last 50 years

Devolution and health care

Which direction?

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Problems and challenges

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Conclusion

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Useful websites

By the end of this chapter you should be able to:

- Describe the general principles by which health care services are funded and organized in the UK.
- Understand the factors that have influenced the delivery of health care over the last 50 years.
- Describe the major problems faced by health services.
- Describe the main ways in which services are delivered.

This chapter links with:

- Overview of health care systems (Chapter 17).
- The structure of dental services in the UK (Chapter 19).
- Planning dental services (Chapter 21).

Introduction

The National Health Service was created at the end of the Second World War. Its structure has remained relatively stable until the 1970s. Since then, politicians

have continued to reform it at an ever-increasing rate and, in 2012, the biggest change to the English NHS structure was implemented (Reynolds and McKee 2012). The question as to why the reforms are being undertaken is crucial. Growing demands, changing epidemiology, better understanding of the determinants of health, and evolving societal values have all influenced the process. Perhaps most crucial is the latter. It is probably more appropriate to describe the current NHS as four differing NHS care systems that are coterminous with the legislative bodies that exist within the UK, namely England, Northern Ireland, Scotland, and Wales. Not only are the planning arrangements becoming more divergent, but also the philosophical approach underpinning each system is beginning to follow very different paths. The NHS has almost never taken a typical theoretical planning approach but rather has evolved due to the wide range of factors and influences involved. These include the changing power of health care professions, the need to ration services, adoption of economic theory (market forces and the internal market), and, not least,

changing governments with differing political stances. The importance of understanding the history of the service and the lessons of the past are that they inform the present and can provide an indication of how the future may look.

This chapter outlines the major influences on the NHS since its inception, describes the major problems currently faced by the NHS, and provides an overview of the ways in which clinical services are currently delivered. It will not give a detailed description of the structure of the health service, not least as by the time the book is published a new structure will exist. The current structure of the health service in each of the four countries of the UK will be available on this book's website, and updated as changes occur.

The original purpose of the health service was to alter the health of the nation by providing free and universal access to health care. However, it became apparent very quickly after the NHS's inception that it was not going to be possible to provide all the health care that was wanted, and the service very quickly changed from having the belief that it could improve the nation's health to one that set out to help people benefit from health care. Indeed, within 5 years of its creation, the first elements of the NHS began to adopt patient charges, including the dental sector.

Outline of the structure

The history of the NHS ties in closely with that of the development of a welfare policy in the UK. While the origins of the welfare state go back to the early 20th century, following the Second World War, government policy centred on addressing five *giant evils*: squalor, ignorance, want, idleness, and disease (Timmins 2001). At the time, the link between each of the problems, the *determinants*, was not made. Indeed, a common assumption made was that by providing a health service, the problem of illness could be *cured* away.

Throughout the last 60 years, the emphasis on each of these *evils* has changed. While at the start all elements were of equal importance, more attention has been placed upon health and education, and less on housing. These changes reflect not only the differing

views of successive governments but also wider societal values and public opinion. For example, the late 1970s and 1980s saw a move away from state involvement in housing, with a push by government to allow people to own their own homes: a move away from a collective approach to a problem to one in which the individual was expected to take a far greater role.

Funding

The NHS is funded primarily by general taxation, free at the point of delivery, but there are some notable exceptions to this. There are charges for prescriptions, and dental services delivered through the General Dental Services are subject to patient copayments. However, expenditure on health care in total also consists of care funded by individuals in the private sector through contributions to insurance or prepayment plans. This is particularly common in dentistry. While it is very difficult to obtain accurate data, what sources exist suggest that the balance between the NHS and non-NHS care reached 50:50 in 2008. For general health care, the figure is closer to 15% of total spend being derived through private arrangements.

In addition to the expenditure on *formal* health care, people can buy items to address health problems. For example, drugs for chronic pain for arthritis sufferers can be moved from *prescription only* to *over the counter*. While this may well make their availability greater, the costs will be transferred directly to the sufferer.

The overall budget for government spending is set each year through a series of negotiations between the Treasury and the numerous Departments, for example Defense, Transport, and Health. Factors affecting the discussions include the tax revenue available, the overall performance of the economy, and political priorities.

Expenditure on health is routed through the Department of Health (for England) and the three appropriate bodies in the other constituent countries (Scottish Executive, National Assembly for Wales, and Northern Irish Assembly). Money is distributed broadly on a population basis to geographical areas. In England this has been through the Strategic Health Authorities,

and a number of adjustments are made for issues such as the degree of rurality. Some areas of the country, particularly those with teaching hospitals and major tertiary services, have received more funding than would be expected on the basis of their population. A series of schemes, since 1974, have attempted to alter the historical funding that gave these areas proportionately higher levels of resources, but although some changes have resulted, these have been very small.

DISCUSSION POINTS 1

What factors would you take into account when deciding whether or not resources should be allocated to a particular service?

What priority would you give to each factor?

Are there any factors that are included that you think should be ignored?

Why?

Major influences over last 50 years

The 1940s saw the emergence of professionalism and, at the end of the decade, the creation of the NHS. Dentistry was included, although there was much unmet need and dentists soon had far more work than had been anticipated. There was a paternalistic attitude to health care: the professions knew what was best for their patients.

The 1950s saw the NHS established as a social model based on equity and universal access, and it remained dominated by the professions. Even at this early stage in its development it was clear that there were not enough resources to fund all demands. Patient charges were introduced in 1952 for dentistry. As Gelbier (1994) said, 'Health care rationing by charge had been introduced'.

The 1960s continued in much the same way as the 1950s, except that financial problems were starting to become apparent within the UK and the pressure on the NHS to contain costs started to become more pronounced. The importance of the economic situation on determining aspects of health policy cannot be

overestimated. The rationale for the initial introduction of patient copayments for elements of care centred more on the need to find funds for the Korean War than any rational reason in the health sector. Indeed, prescription charges were abolished in 1965, only to be reintroduced 3 years later. Following their abolition, the NHS drugs bill soared: low-cost items that had previously been bought by individuals were subsequently prescribed. Other modifications were also introduced in an attempt to negate the impact on the most disadvantaged members of society, with children and older people being exempt, as well as individuals receiving benefits, and certain chronic conditions such as diabetes.

The 1970s saw the first reform of the NHS, with the introduction of a very complex structure based upon the concept of consensus management. There was representation of many groups and professional managers were included at that time. They were known as *administrators*. For the first time, concepts such as planning health services became important and this was encouraged by the realization that services were unequally distributed and that there was a need to attempt to redistribute them. The Black Report, published very quietly in 1980, demonstrated that 30 years' of health care free at the point of delivery had not solved the problem of health inequalities, which persisted and in some places had become worse. There was a fiscal crisis caused, in part, by oil prices, and rationing in the health service became more pronounced. By the end of the decade, financial cuts were becoming apparent.

In the 1980s the rate of reform increased. First, one tier of management was removed and then the concept of *general management* was introduced. However, this was limited in that management was responsible for the financial control, while clinical standards remained totally within the remit of the professionals. There was a major emphasis on cost-effectiveness that became almost synonymous with the cheapest being best. The political atmosphere meant that the concept of *society* changed and was replaced with an era of individual responsibility.

Subsequent policy trends included legislation that defined *Care in the Community*, meaning that large

numbers of long-stay hospitals for psychiatric illness and for people with learning disabilities were closed. The policy was to care for as many people as possible within the community, largely based on the argument that it was cheaper, but the evidence to support this policy was remarkably weak.

Within the professions, combined with the growth in technology, specialization evolved rapidly. For example, currently the General Dental Council now recognizes 13 specialist lists. The development of evidence-based care started, although its adoption was slow. The role of patients changed; between dentist and patient it became less unequal, and the part of patients moved from being passive recipients of care to 'consumers' of health care, with the dentist as the 'provider' of care. The health professions had come under growing criticism, not least following two serious scandals, the Bristol Royal Infirmary, in which over 30 children undergoing heart surgery died unnecessarily, and the conduct of Harold Shipman, a general medical practitioner who killed at least 250 patients.

Rationing also became more explicit; it was not possible to deliver all the care that was wanted. In the main, this was controlled through waiting lists, although some treatments were not available and limitations were placed on expensive drugs.

The 1990s saw a continuation of all the themes from the 1980s, combined with the most major reform since its inception. Two functions were identified: the estimation of need and planning of health care; and the provision of health care. Responsibilities for these functions were divided: health authorities assumed the function of *commissioning* health care, while trusts and the contractor professions *provided* health care. The concept of market forces briefly entered the health service, although by the end of the decade this had gone.

The professions continued to develop, with the introduction of clinical audit: clinical effectiveness became important. Cheapest was no longer best, but rather the intervention that provided the best outcome for the best price was preferred; the term value-for-money became commonplace in government documents. The building of new hospitals started to become financed through agreements with private companies (Private Financial Initiatives, PFIs).

The Bristol and Shipman scandals, along with other activities, gave rise to external concerns that saw the introduction of *clinical governance*. This was a system of total quality assurance where the chief executive of the organization now had responsibility for clinical as well as financial matters. The commissioning of health care was reviewed at the end of the decade, when it was decided that this role should be returned to those who were considered to understand the needs best—the primary care practitioners.

The change of government at the end of the decade to the first Labour government in many years led to a substantial alteration in policy. Public health was considered to be important, and the period saw the publication of reports that highlighted the growing health inequalities within society (Department of Health 1998; Scottish Office 1998; Welsh Office 1998b). Health services were to work closely with other bodies, particularly local authorities, to alter the determinants of health.

The year 1999 saw the creation of new parliaments and assemblies in Scotland, Northern Ireland, and Wales as a result of the devolution of power from Westminster. These bodies also have major responsibilities for health and education. The importance of the political influence on welfare within a country should not be underestimated, and, as intimated early in this book, the health care system evolves as part of the welfare arrangements. With devolution, important differences are starting to appear both in the general health care and the dental health care system.

The most recent reform programme has seen the biggest and most radical structural change to the NHS since its inception, although it is limited to the English NHS. See Box 18.1 for a summary of the aims of the health reforms in England. By April 2013, the complete

Box 18.1 Aims of 2013 health reform in England

- To place patients at the centre of the NHS.
- Changing the emphasis of measurement to clinical outcomes.
- Empowering health professionals, in particular GPs.

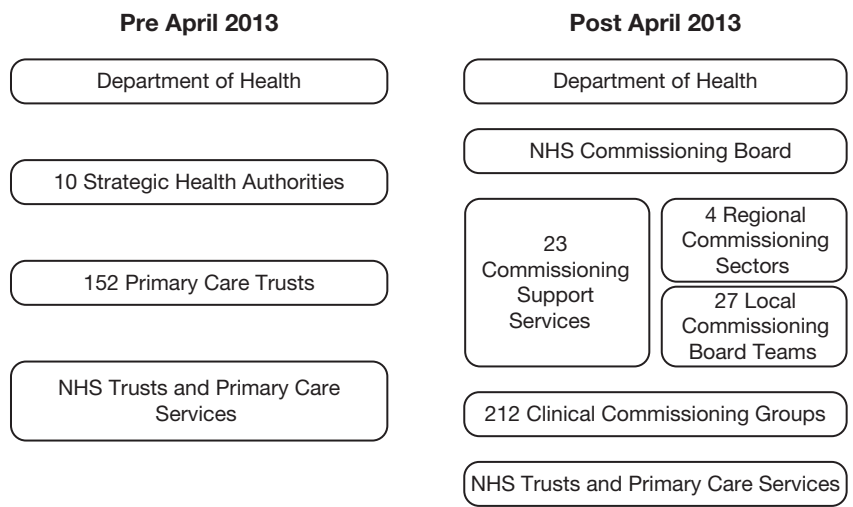


Figure 18.1 Structure of the NHS in England pre and post April 2013.

system will be overhauled and will see responsibility for both financial spend and clinical activity lie with general medical practitioners (GMPs) who will be organized into clusters, termed clinical commissioning groups (Figure 18.1). In addition, while general public health functions are being divorced from the NHS and placed in the hands of local authorities, those concerning dental public health will sit within a new body called Public Health England.

DISCUSSION POINTS 2

What are the advantages and disadvantages of public health being based within local authorities as opposed to the health service?

Devolution and health care

The UK is currently made up of four administrative units, each of which has a degree of power in deciding policy. The administrative units are the English and Scottish Parliaments, and the Welsh and the Northern Irish Assemblies. Greer and Rowland (2007) examined what they termed the *national values* within each of the four units and concluded that these had indeed impacted on the direction that each of the systems had

taken. While in England the approach has been the adoption of markets to find solutions, Scotland and Wales have adopted a more collaborative and collective approach. Northern Ireland has based its approach on ‘having a say rather than having a choice’. However, what the authors also noted was the importance of the role that EU policy has on all four of the arrangements’ evolution.

How then have these values impacted on the nature of the health care system? The first impact is in terms of structure. In England, following devolution, ten Strategic Health Authorities were created who were responsible for strategy and governance issues, with 152 Primary Care Trusts and approximately 130 Foundation Trusts, the latter having far greater financial and operational freedom (Figure 18.1). Scotland, however, retained a far tighter structure, with 14 Health Boards based on geography, and a number of non-geographical area-specific national Special Health Boards with responsibility for such issues as the ambulance and blood transfusion services. Trusts were abolished and the hospitals were managed by the acute division of the NHS Board.

In Wales, up to 2009, 22 Local Health Boards existed along with seven NHS Trusts. These have now been subsumed into seven Local Health Boards that have been given the responsibility for all health services,

although Public Health Wales NHS Trust along with cancer and ambulance services were created as separate entities. In Northern Ireland, the health and social care services have been merged to create a single Department. Six Health and Social Care Trusts exists, on a geographical basis.

Besides the structural elements, some important differences concerning the service issues have evolved too. For example, in Scotland free personal care currently exists, while in Wales people are exempt from prescription charges. There are also important differences in the way that the dental sector is changing for both care providers and recipients.

In England the primary dental care contract introduced in 2006 placed the first financial cap on dental spend and has come under considerable criticism. The 2006 contract used a currency of Units of Dental Activity (UDAs) to measure activity and link it to payment. Following a Health Select Committee Report, the Department of Health has announced that a new contract will be introduced, possibly by 2015, using different outcome measures and linking the financial aspects to quality payments, including the patients' experience, as well as activity. In Northern Ireland, Wales, and Scotland the dental contract remains more similar to that operating in the NHS prior to 2006. This includes the retention of fee-per-item payment for activity and the use of registration, although for Northern Ireland there has been ongoing discussion concerning pilot arrangements using a block contract. Perhaps most crucially, it is envisaged that resources for dental care will be split from those for medical care.

Which direction?

The future of the health service is difficult to predict, especially given the huge uncertainty about the economy. That said, besides the financial pressures, the factors that have influenced developments to date will continue to remain. These include:

- the basis of needs to inform planning;
- the increased role of patients as consumers;

- the use of an evidence base to inform decision-making;
- increased centralization of decision-making, although a degree of local flexibility may exist;
- the integration of health promotional and public health activities within public services, particularly education and local authorities;
- the adoption of a greater team approach, with consideration given to skill mix to include non-health care professionals.

DISCUSSION POINTS 3

What information is contained within a local needs assessment (see Chapter 21)?

Why might this be important for health care staff?

Clinical governance

Following the major health scandals identified in the previous section (the Bristol Royal Infirmary and the activities of Harold Shipman), a new concept was introduced alongside the 1999 health service reorganization. This concept was designed to drive forward quality improvement within the NHS and was known as clinical governance. It was of crucial importance because for 'the first time, all health organizations will have a statutory duty to seek quality improvement through clinical governance' (Scully and Donaldson 1998).

This process meant that quality improvement was to be combined with financial management, and overall responsibility for it rested with the accountable officer of the health body, whether a Primary Care Trust, hospital or, indeed, surgery. Independent contractors such as general dental practitioners were also included in the system. Two bodies were established to help the process: the National Institute for Health and Clinical Excellence (NICE) and, at the time, the Commission for Health Improvement (CHI). Since then, the name of CHI has been changed twice, and the roles identified for CHI are currently being undertaken by the Care Quality Commission (CQC). Every site that provides health or social care activities needs to be registered with the CQC. Box 18.2 and

Box 18.2 The core functions of the CQC

- To ensure that care provided by hospitals, dentists, ambulances, care homes, and services in people's own homes and elsewhere meets government standards of quality and safety.
- To ensure that people are treated with dignity and respect.
- To ensure that food and drink meets people's needs.
- To ensure that the environment is clean and safe, and that the organization is managing and staffing services appropriately.
- Safeguarding.

Box 18.3 The main functions of NICE

- To provide evidence-based guidelines on the most effective ways to diagnose, treat, and prevent disease and ill health.
- To develop quality standards, a concise set of statements designed to drive and measure priority quality improvements within a particular area of care.
- To undertake technology appraisals to ensure that people across England and Wales have equal access to new and existing medicines that are deemed clinically and cost effective.
- To provide public health guidance aimed at preventing ill health and encouraging people to live a healthy and active lifestyle.

Box 18.3 illustrate the core functions of the CQC and NICE. However, despite the increased regulation, problems continue to exist. Currently, an Inquiry is ongoing into the Mid Staffordshire NHS Foundation Trust at which, despite being given a rating suggesting a high level of performance, the true picture was far worse. The results of this Inquiry are likely to have far-reaching implications for the whole of the regulatory framework in health care.

NICE's main role is to identify techniques and therapies that need to be appraised (Box 18.3). NICE looks at the clinical and cost-effectiveness evidence to produce guidelines. It also has a role in disseminating the

results of its work. In essence, NICE examines developing and existing techniques and therapies to see if they work and how much they cost. It then decides whether these therapies and techniques should be undertaken within the NHS. The effect of this is that NICE has already recommended against some treatment; for example, ozone and the prophylactic removal of third molar teeth, although the guidance has been challenged (McArdle and Renton 2012).

Commissioning of health services

Within the NHS, health services are planned and provided within an overall budget. Commissioning health care, the process of deciding what health care should be provided, has historically been undertaken by primary care organizations. The budgetary allocation that each primary care organization receives is then allocated, ideally on the basis of need, to provide primary and secondary care. Not all hospitals provide, for example, cardiothoracic surgery.

The commissioning of services involves four key stages: identification of the need for health care of the local population; the development of a plan to address the need; the purchasing of services to meet the need; and monitoring of how well the services are addressing the need. Whether it is for general or oral health, each stage should ideally be based on sound information: first, the epidemiology of diseases, their impact on the population, and the effect of differing arrangements to address the problems; second, knowledge of the resources that are available to purchase care, and the ability of the commissioning team to develop a contract with the required specifications; and third, information systems to ensure that progress is being made according to the agreed plan.

This approach to care provision has led to the use of competition to try to ensure that services are run in the most cost-effective manner. However, this is not without problems. The ability of a contract to make specific the nature of the work required is very difficult and small changes in one particular area of a Trust may have a huge impact on its viability.

Problems and challenges

Problems facing all public services

All services funded by the state are faced with the same major problem. They need to justify their existence. Why should the state provide health care for its citizens through taxation? Would it not be better if each person paid for his or her own medical care as and when he/she needed it? To what extent do inequalities increase given the socio-economic disparities in disease, with the poor in general having the highest levels of disease?

Problems and challenges facing health care

This chapter concentrates on those problems that affect the whole of the country at the moment: the macro problems. The micro problems are discussed in Chapter 3.

It treats demand rather than need

The NHS provides care to people who ask for help. Thus it treats demand for care rather than need for care. The effect of this is that inappropriate care may be being delivered.

Cost constraints

Although the NHS budget is growing in real terms, the required or wanted expenditure is growing at a faster rate. As such, it is not possible to provide all health care that is wanted. With the financial problems arising from the economic downturn, the NHS will have to deal with substantially lower resources in real terms than previously. This will mean cost constraints and rationing.

Conflict between cost of treatment and clinical effectiveness

Clinical effectiveness helps identify the most effective care modality for a given condition. However, this is not necessarily the cheapest treatment. The most clinically effective may be the more expensive. Balancing clinical and cost effectiveness is a key role for decision-makers, although savings arising from disinvestment in those

therapies that have been shown to have no worth can lead to a release of resources. Decisions are going to be more difficult where the clinical benefit is only marginal but the cost is much greater. Examples of this include many of the newer drugs being offered that give only marginal returns.

Ageing population

Within the UK there is an ageing population: proportionately there are fewer younger people and more older people. This is likely to have an important effect on the health service. More care will be needed for the growing older population, and this might be exacerbated by an increase in chronic disease levels. That said, there is evidence that the greatest health expenditure on a person is during their first and last 6 months of life, irrespective of their age. This may mean that the expected increased expenditure is likely to result simply because a greater proportion of the population are reaching the end of their natural life.

Increase in inequalities

Health inequalities within the UK have increased. If these are to be addressed, there is a need to reallocate resources towards areas with poorer health, or towards actions that will differentially improve health in these areas. It is acknowledged that many of these activities may be outside the health sector. How this will alter funding is not known.

Care is rationed in some areas

The level and type of health care that is provided is decided by the commissioning bodies. Although there are a number of standards outlining what services must be provided, variations between areas continue to exist. One example that has been discussed in the press is the provision of infertility treatment in different areas.

DISCUSSION POINTS 4

Why might different services exist in different areas?

Why might these need changing over time and what difficulties may exist when attempting to do so?

Health care is a political issue

In the UK the main decisions regarding the funding and structure of health care are made within government. Health is seen as an important issue that strongly influences the electorate's decision on who to vote for. Members of parliament are often approached by constituents to discuss problems within the health service, which means that locally based problems can have an extremely high public profile and solutions may be negotiated through the media.

Health care delivery in the UK

Primary care

Access to health care in the majority of cases is initially through primary care arrangements, and subsequent access to secondary services (when necessary) is controlled through this route. It has been argued that one of the main benefits of the NHS is the role of primary care to act as a gatekeeper to more specialized care. The majority of doctors and dentists working in primary care are independent contractors: they combine the practice of medicine and dentistry with running a business. Additional support staff, for example health visitors, district nurses, and practice staff, are employed by the business. One of the important differences between medicine and dentistry is that the NHS has historically given medical practice grants towards their staff employment; dental practices have no such benefits, although staff costs were included in the expense element of any pay negotiations.

Independent contractors

The contract under which general practitioners are employed is based upon the principle of the number of patients registered with them. While this remains the major way in which they are paid, the contract has developed to include payment for achieving certain levels of immunization rates and other fee-for-item of service payments. These are known in general terms as the quality outcomes framework targets. Doctors also receive grants for their premises.

Dentistry has always been funded by a different basis. General dental practitioners run a small business, and they are responsible for all their capital costs and staff costs. They are free to see as many or as few patients as they want and can determine the mix between private and NHS care. Since 2006, the NHS dental contract in England pays dentists for the number of units of dental activity (UDA) they provide. Each contract holder has a target for the number of UDAs they have to achieve over the year running from 1 April to 31 March. (Orthodontic care is financed using units of orthodontic activity (UOA).) In both cases, the contract is currently very tightly controlled. Should a contract holder underperform by more than 4% in the number of UDAs, they are technically in breach, which may lead to the cancellation of their contract. Overperformance is not normally rewarded. However, the Department of Health (England) has announced that a new contract will be introduced with a possible target date of 2015, following heavy criticism of the 2006 contract.

Community health employees

District nurses provide nursing support for those at home on a day-to-day basis. With the increasing emphasis on early discharge from hospital, they have a very important role, as well as providing nursing care for those who are not able to care for themselves. *Health visitors* provide health promotion advice and support to parents of those under 5 years.

Intermediate care

Within general practice, the concept of intermediate care has developed. A general practitioner has special skills and expertise in a disease such as diabetes. He/she manages all the patients of the practice (and maybe neighbouring practices), thus relieving the secondary care service of the volume of work. In medical practice, a number of general practitioners with special interests (GPwSI) have evolved. In dentistry a similar concept has started to evolve and dentists with special interest (DwSI) in certain fields now operate with an NHS contract, for example DwSIs in oral surgery and endodontics. The financing of this

varies, with each DwSI agreeing a contract with the primary care organization, the price of which is substantially lower than that paid under the national tariff arrangement.

Secondary care

This is provided by consultants and other specialist-grade staff. It is almost entirely based in hospitals, the pricing of which is agreed on a national fee scale, the national tariff.

Tertiary care

Some services are provided on a regional or even national basis, and are known as tertiary services. One of the major problems with tertiary services is that they can be quite some distance from people's local health services. The concept of *managed clinical networks*, where various parts of the specialist care will be provided in different localities, is being developed and includes DwSIs as well as Specialists and Consultants.

DISCUSSION POINTS 5

What are the advantages and disadvantages of being able to access a specialist directly? You need to look at this from both the individual's and the health care system's points of view.

Other sectors

It is very important to note the role of the social services, particularly in providing care and support for people with disabilities. The voluntary sector is important in such things as providing hospice care. The main area in which the private sector provides care is in the provision of nursing homes and residential care for the elderly.

Conclusion

The NHS is a highly complex organization that continues to evolve. It provides a very wide range of services, mainly free at point of delivery. In the future it aims to

become more locally responsive and more integrated with other services. With devolution, the NHS has begun to fragment, with each of the four territories developing differing approaches to the provision of care. The most recent changes have seen a more market approach being adopted in England in an attempt to control costs, while the remaining areas have continued to adopt a more collective approach to solve the arising issues.

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- Useful websites
- England: <http://www.nhs.uk>.
- Northern Ireland: <http://www.hscni.net>.
- Scotland: <http://www.show.scot.nhs.uk>.
- Wales: <http://www.wales.nhs.uk>.

19 The structure of dental services in the UK

CHAPTER CONTENTS

Introduction

Financing oral health care

Support systems

Oral health care in the UK

Private dental care in the UK

Dental care professionals (DCPs)

Conclusion

References

By the end of this chapter you should be able to:

- Describe how oral health care may be managed and organized.
- Describe the structure and features of the primary and secondary care sector in the provision of public sector dental care.
- Describe the structure and features of private dental care.
- Describe methods of remuneration for oral health personnel.
- Describe the role, training, and use of persons complementary to dentists in the provision of dental care.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- The structure of the NHS in the UK (Chapter 18).
- Planning dental services (Chapter 21).
- Problems with health services (Chapter 23).

Introduction

This chapter will briefly describe how oral health care may be managed and organized and how health workers may be remunerated. This will be followed by a short outline of the ways in which oral health care is provided in the UK. A separate overview of dental care professionals (DCPs) is presented in this chapter. The reform of the NHS is ongoing, so this chapter discusses principles rather than detail. Since the devolution of health care to governments in Scotland, Wales, and Northern Ireland, variations in provision are occurring across the UK and some of these differences are highlighted.

Financing oral health care

If oral health care is to be provided it has to be funded. The money has to be derived from the public and this can be either from individuals or from taxation. Within the UK there are a variety of ways in which oral health care is funded. Figure 19.1 shows the possible flows of money.

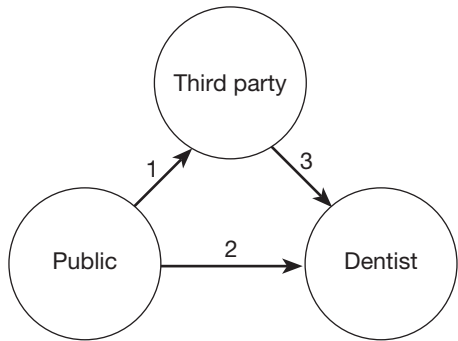


Figure 19.1 Routing of funds for oral health care.

The model that exists in the UK is in the main centred on routes 1 and 3, based on taxation, either direct or through national insurance contributions, and its subsequent allocation to various public-funded services, including dentistry. In Germany, the arrangement is slightly different in that third-party insurance groups are involved and a proportion of an individual’s annual salary is allocated to health care. A third model operates in the USA under the guise of *managed care*. Individuals buy into a care plan that is organized by a health care company, which subsequently contracts with dentists to provide a level of care.

In route 2, the public pays the dentist directly for his or her services; this is a private arrangement. A third party may intervene to control pricing. For example, Dutch and Swedish adult dental care is now mostly in the private sector, but each year the profession negotiates the scale of fees with their government.

The subsequent distribution process for paying oral care workers is illustrated in Figure 19.2. There are again three mechanisms:

- 1 A purely private arrangement.
- 2 The state pays the total cost.
- 3 The co-payment model, where a contribution is made by the patient for the cost of his or her treatment.

Once the payment systems have been identified, it is necessary to decide what will be paid for. There are four main ways of paying for care:

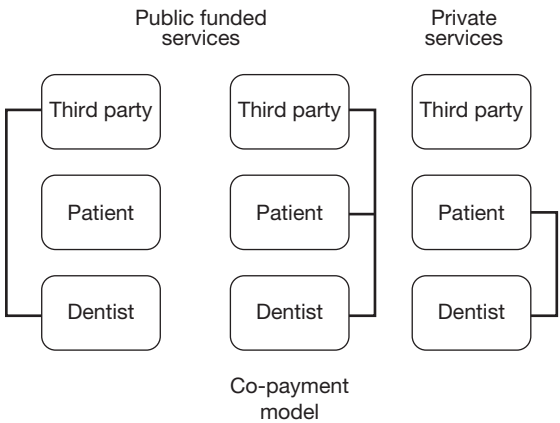


Figure 19.2 Arrangement of distribution options.

- fee-per-item
- a sessional fee
- capitation
- salary.

Table 19.1 lists the main advantages and disadvantages of each of the mechanisms. The two opposite ends of the spectrum are fee-per-item and capitation. Nearly all care systems rely on both capitation and fee-per-item for payment of the majority of care, and salaried arrangements for the minority. In the UK, the latter include specialist services within the secondary care sector, that is, the hospital setting, and other groups where more conventional arrangements do not necessarily work well. An example of the latter is people with severe learning disabilities whose care requires more visits or longer visits due to their disability. More usually, in other countries, specialist services are also provided on a fee-per-item in a practice setting.

Support systems

Irrespective of the payment system implemented, there are a number of prerequisites to maintain the arrangements. They can be divided into three: information systems, education systems, and probity systems.

Table 19.1 Main mechanisms for rewarding dental care workers

Mechanism	Advantages	Disadvantages
Fee-per-item	Good in areas of high need	Potential for over-treatment
	Reward for output	Difficult to budget
	Treatment focus	Little incentive for prevention
	Easy to measure	
Sessional	Regular income	Adverse risk selection
	Reward for output	Potential for under-treatment
	Minimizes resource costs	Untried
	Option for special needs groups	
Salaried	Administratively simple	Possible under-treatment
	Facilitates budgeting	Lack of financial incentives to work
	Treatment not influenced by profit	Requires extensive management structures
	Other benefits: sick pay and maternity leave	
Capitation	Administratively simple	Adverse risk selection
	Facilitates budgeting	No knowledge of output
	Reward linked to effort	Possible under-treatment
	Treatment not influenced by profit	Payments 'unfair' in areas of high need compared to low need

Information systems

Information is required to assess three aspects of an oral health care system: the disease profiles, activity data, and management information. The goal of the reward (payment) system is to reduce the need for treatment. Workers should be paid commensurate with their contribution in achieving the reduction. In order to assess both the contribution and, more fundamentally, what is happening, a mechanism to collect disease data is required as well as to record what treatment is provided. This is achieved through a combination of routinely collected data and epidemiological surveys. In a predominantly private system it is extremely hard, if not impossible, to collect data on treatment provision.

Education systems

Within any care system, the workforce needs to be trained to provide the appropriate level of care. Oral health workers need to complete appropriate training programmes to enable them to provide care at an appropriate level. They then need to be able to access and participate in further education and training to maintain and develop their skills. This may, or may not, include the necessary training to become a specialist.

Probity systems

Probity is an assessment of the honest accountability of the activities of a system and consists of four components:

- 1 The accuracy of any fee claims. Whenever a claim is made under a system, the payer needs to make sure that what is being claimed for is valid. Has the filling been done or the scale and polish carried out?
- 2 Was the treatment carried out to a satisfactory standard? This requires both a clinical assessment and a reference standard.
- 3 In addition to a claim's validity and the standard of the treatment, the quality of the initial diagnosis and treatment planning is also important. The former is more difficult, as patients tend to be seen once the treatment has been completed and a claim submitted. Nevertheless, the monitoring arrangements are such that abnormal patterns of treatment prescription by practitioners can be identified and explanations sought, although this is more difficult in a totally private system. In England this is run by the Clinical Services Division of the NHS Business Authority.
- 4 All systems, except a totally private contract, will have limitations on the treatments provided and under what conditions they can be prescribed. These are described in the *terms of service*, the name given to the contract between the care provider and the paying agency. It may include such issues as limiting the total costs of a course of treatment before seeking prior approval in advance of undertaking the work, not being allowed to repeat work, making a claim for it before a certain date, and even what materials can be used.

The next section **Oral health care in the UK** will describe the organizational structure, service components, methods of remuneration, and training of personnel of oral health care in the UK.

Oral health care in the UK

Oral health care provision in the UK occurs in both the public and the private sector. The majority of publicly funded care is provided by the primary care sector. The largest sector is the General Dental Service (GDS), consisting of independent contractors who hold contracts with the NHS, and a number

of corporate bodies who employ dental staff. The smallest sector is a salaried service providing care mainly to those who are unable to access care through the GDS. The smaller sector is organized in a variety of ways across the UK, although it is usually known as the Community Dental Service or the Salaried Dental Service. Secondary care is mainly provided in the hospital sector, although there are increasing numbers of specialists working in primary care. In addition, the Armed Forces provide their own dental service, the Dental Defence Agency, though the numbers involved are small.

In addition to the public sector, treatment provision also occurs through the private sector. Payments for treatment under non-NHS arrangements are through a variety of mechanisms, including self-pay schemes, capitation, and insurance schemes.

General Dental Service

Across the UK there are now four different organization and payment systems for NHS primary dental care through the GDS.

In England and Wales dentists are paid for each course of treatment they complete on a patient. Courses of treatment are banded:

- Band 1: Examination, scale and polish, prevention.
- Band 2: All of band 1 plus any fillings and extractions; endodontic treatment is also included here.
- Band 3: All of bands 1 and 2 plus any crowns, bridges, or dentures.

Patients pay a set charge per band regardless of how much work is required within each band. The costs are different in England and in Wales. Dentists hold a contract with the National Commissioning Board in England and the Health Board in Wales to provide a certain number of Units of Dental Activity (UDA). Band 1 earns 1 UDA, Band 3 earns 3 UDAs. The system was introduced in 2006, after comparatively little change in the GDS since its inception in 1948. It was extremely unpopular with dentists as the measurement of a dentist's activity was believed to be inaccurate, and the scheme was introduced without piloting the methodology. Under the previous GDS system, patients had a

short-term (6 months) contractual arrangement with their dentists who would provide a course of treatment that rendered them 'dentally fit'. The dentist was paid on a fee-per-item basis and the term 'dentally fit' was never fully defined. The reforms of 2006 were significant, as responsibility for planning and securing NHS dental services was devolved to local Primary Care Trusts (PCTs), the number of patient charges were reduced from over 400 to just three, and the mechanism by which dentists were paid changed from an item of service to a single annual sum paid in return for a number of courses of treatment (CoTs) weighted by complexity (Steele *et al.* 2009). At the time of writing, this whole system is being reviewed.

In England approximately 50% of the population have seen an NHS dentist in the last 12 months. The Steele Review (Steele *et al.* 2009) reported a series of alternatives for providing dental care. In England there are 70 pilot schemes looking for new ways of delivering dental care, aiming:

- to improve the quality of patient care;
- to increase access to NHS dental services;
- to improve oral health, especially the oral health of children (Primary Care Commissioning 2012).

These pilots are full capitation pilots, with some pilots having incentives for seeing extra patients or improving oral health.

In Scotland and Northern Ireland, dentists continue to be paid on a fee-for-item of service basis.

Training

Following graduation, any UK qualified dentist wishing to work in the GDS is required to complete a 1-year vocational training course. This involves being assigned to a recognized training practice and attending a day-release course. The educational content of each course is not fixed nationally, but topics that are generally covered include peer review, audit, practice management, and dental policy, as well as clinical techniques. Dentists also have to undertake 250 hours of continuing professional education over a 5-year period, 75 of which must be verifiable (see <http://www.gdc-uk.org/Dentalprofessionals/CPD/Pages/CPD-for-dentists.aspx>). Dentists also have to follow guidelines on peer review and clinical governance.

[aspx](http://www.gdc-uk.org/Dentalprofessionals/CPD/Pages/CPD-for-dentists.aspx)). Dentists also have to follow guidelines on peer review and clinical governance.

The Community and Salaried Dental Service

The Community Dental Service (CDS) or Salaried Dental Service (SDS) in England began as a 'safety net' for people who could not access mainstream dental services, but more recently it has also evolved into a specialist community-based service catering for people with disabilities and other vulnerabilities. The CDS/SDS also delivers dental public health functions—monitoring trends in the oral health of the population through screening and epidemiological surveys, and providing health promotion.

The CDS/SDS is managed in a variety of ways across the country. At one extreme, in Wales, it remains a directly managed service of the Health Board. At the other, in parts of England, it is a Social Enterprise Community Interest Company (CIC) wholly owned by its employees. The National Commissioning Board in England is responsible for commissioning these services.

Current remuneration arrangements

The CDS/SDS is a salaried service.

Regulation

Although a small service, the CDS is closely monitored through its contractual arrangements with the Health or Commissioning Board.

Training requirements

As with the GDS, vocational training after qualification is a compulsory requirement for dentists employed in the CDS and staff are expected to undergo regular continuing professional education. For dentists wishing to obtain promotion within the CDS/SDS an appropriate postgraduate qualification is required.

The specialty of Special Care Dentistry was recognized in 2009 by the General Dental Council (GDC) and most specialists practice in community settings. Paediatric dentistry also works in these primary care

settings. Such specialists have recognition from the GDC and require at least 3 years' formal training in recognized training posts.

The Hospital Dental Service

The Hospital Dental Service (HDS) employs approximately 2,500 dentally qualified personnel (Anonymous 1999). It serves two functions: the provision of specialist dental care and the training of undergraduates and postgraduates.

There are strict contractual arrangements with the NHS for the provision of the HDS and it is estimated that the HDS provides about 7% of dental care in the UK (Bradnock and Pine 1997).

Remuneration arrangements

Dentists operating with the HDS are salaried and salaries are set by the Dentists and Doctors Review Body. Consultants have parity with medical colleagues and similar staffing arrangements. For those hospitals that have a teaching commitment, the additional funding required is paid for by the Service Increment for Teaching Formula (SIFT), which is paid to recognize the additional costs associated with providing dental student education. Dental schools and hospitals also receive money through research and development funds. The activities of specialists is shown in Box 19.1.

Box 19.1 Activities of specialists

- Consultant advice to GDPs, GPs, community dental staff, and community medical staff.
- Acting as a point of referral for other specialities.
- Undertaking complex treatment for patients who cannot receive care in a primary care setting.
- Providing routine care for some special need patients.
- Providing accident and emergency cover for dental infections and maxillo-facial trauma.
- Providing dental care for inpatients in long-stay facilities.
- Providing dental care for short-stay patients in facilities for the relief of pain and sepsis.

Regulation and training

The training of undergraduates and postgraduates is monitored by both the GDC and the Royal Colleges, the latter acting as gatekeepers to consultant and specialist training. The GDC makes visitations to accredit undergraduate training and lays down strict criteria for the training of consultants. In addition, university education is monitored through the Quality Assurance Agency.

Private dental care in the UK

There are three ways in which people obtain private dental care from a dentist in the UK:

- Self-pay: that is, they pay for dental care out of their own pocket.
- Capitation arrangements.
- Dental insurance arrangements.

Self-pay private care

Dentists operating under self-pay may charge any fee they choose, although a suggested tariff of fees is produced by the British Dental Association. The costs are usually based on a fixed charge per time unit plus any associated laboratory expenses. The majority of non-NHS care is provided through these arrangements, and in many cases in combination with NHS care.

Capitation plans

Capitation plans provide a level of care over a specified period for a specified sum of money. The patient's oral health is assessed and any treatment is provided prior to enrolling on the capitation scheme. The dentist decides at what level the patient will enter the plan and the cost of the plan will be set accordingly. Someone with a low disease history will pay a smaller sum than someone with high disease levels. The basis for this arrangement centres on the idea that the best predictor of future disease is past disease. Under capitation, the dentist has the incentive of encouraging greater

preventative habits in their patients, thus reducing the need for restorative care.

Dental insurance arrangements

Indemnity insurance

The insurer underwrites the plan. The level of dental health is not known prior to the agreement. Patients are free to choose their dentist and type of treatment. The insurance covers the patient's treatment needs, which may include extensive restorative care. Premiums are thus higher than capitation. There is no preventive incentive. The patient pays the dentist directly for dental treatment and is then reimbursed by the insurance company making a claim.

Cash plan insurance

Cash plans provide cash benefits towards primary care. Some plans specialize in providing benefits for dental treatment only, but the majority provide for a range of primary care services that would include dental care. The plan is usually renewed annually and provides cash up to a maximum level to cover dental treatment.

Dental payment plans

A dental payment plan typically takes place within individual practices. It is not an insurance scheme, since patients pay the full cost of treatment. It does, however, allow the patient to spread the cost of treatment over time. It is particularly useful for expensive courses of treatment, such as orthodontic fixed appliance therapy and complex crown and bridge work.

Corporate bodies

Besides individual dentists, there are a number of 'companies' that can provide dental services. These provide services both within and outside the NHS. These companies have to meet one additional requirement that differentiates them from other companies: the majority of directors have to be dentally qualified either as dentists or as dental care professionals (DCPs). Economies of scale and a quality brand name

are the main reason for companies to work to establish dental practices (Blackburn 1999).

DISCUSSION POINTS 1

How would you define the term 'dentally fit' as

- a dental patient?
- a dentist?
- the Minister for Health?

Dental care professionals (DCPs)

For many years, doctors have been used to working with a considerable number of allied professions, for example, medical physicists, speech therapists, and physiotherapists. Doctors are used to diagnosing a problem and then referring for specific items of treatment. In recent years, these professions have developed considerable expertise and often undertake parts of the diagnosis for themselves.

In dentistry, the development of allied professions has been much slower, and dentists have retained almost all of the operative work for themselves. However, dentists are expensive to train and employ and a considerable proportion of their tasks are fairly routine and of low skill level. Hygienists were readily accepted by the profession, but other groups have been less readily welcomed.

Types of DCPs

Within the UK there are various types of DCPs:

- dental nurses
- dental hygienists
- orthodontic therapists
- dental therapists
- dental technicians
- clinical dental technicians.

All of these groups are required to register with the GDC. Each of these is governed by legislation that is also of relevance to dentists regarding their permitted

clinical functions. The range of duties and treatments that each group is permitted to undertake is specified in regulations that are amended in the light of clinical advancement and are published in the *Scope of practice* (General Dental Council 2009). For example, dental hygienists were not initially permitted to give any form of local anaesthesia but are now permitted to give infiltration anaesthesia.

Purpose of DCPs

Having defined DCPs their purpose can now be outlined. Why are they needed in addition to dentists? The Nuffield Report (Nuffield Foundation 1993) said that it was convinced that a more effective service might be provided within cash limits if greater numbers of these groups of staff were employed. Within British dentistry the concept of the need for a team approach to the provision of dental care has become more accepted as being desirable. In essence, this sees the need to divide tasks between different members of the team, depending upon their areas of skill and expertise. At its best, the dentist would undertake the examination, diagnosis, and prescription of the care required for the patient and then delegate various duties to the team members. The dentist would then be able to concentrate on those tasks for which only dentists are qualified.

The development of DCPs has been severely restricted by the numbers in training and the opportunities that are available. Until these factors are changed, it is unlikely that there will be much development in this area.

DISCUSSION POINTS 2

What benefits can you see for the patient and the dentist in the development of team dentistry? You should look at the section in Chapter 17 **What is a high performing health care system?** to help you plan your answer.

Conclusion

There are a number of ways in which the provision of care can be organized. All systems have a basic structure: an initial method of allocating resources, their subsequent distribution, monitoring arrangements, and educational arrangements. Resources can be allocated by an individual to pay for care, or be pooled through the collection of premiums or taxes. No country leaves dental care entirely up to the individual, although differing priority groups exist.

Methods for paying dental care workers are limited to four main mechanisms: fee-per-item, capitation, salaried, or on a sessional basis. Irrespective of the method of payment, supporting structures are required. These include the information systems, probity mechanisms, and training system.

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20 The European Union and dentistry

CHAPTER CONTENTS

Introduction

Dentistry and the European Union

Freedom of movement

The Dental Directives

Specific requirements relating to registration

Specialization in Europe

Dental practice in Europe

Recent developments

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Describe the relevance of the European Union to the practice of dentistry.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- Overview of health care systems (Chapter 17).

Introduction

As the UK is part of the European Union it is important to understand the effect this has on the practice of dentistry. This chapter briefly reviews the European Union legislation as it relates to dentistry, and describes common features found in European states with regard to

the practice of dentistry. The European Union consists of 28 member states with over 520 million citizens.

Dentistry and the European Union

Article 129 of the Treaty of Rome requires the European Union:

- to contribute towards ensuring a high level of human health protection;
- to direct action towards the prevention of diseases, particularly of the major health scourges, including drug dependence, by promoting research into their causes and transmission, as well as health information and education.

One area in which the European Union works is by funding collaborative research between member states, for which major research schemes are available.

It is not yet clear what the European Union's role will be in public health, although there are developments in this area.

Freedom of movement

In 1969, the principle of freedom of movement was established and aimed to 'abolish any discrimination based on nationality between workers of the Member States as regards employment, remuneration and other conditions of work and employment'. This means that every worker who is a citizen of a member state has the right to:

- accept offers of employment in any European Union country;
- move freely within the European Union for the purposes of employment;
- be employed in a country in accordance with the provisions governing the employment of nationals of that country;
- remain in the country after the employment ceases.

The freedom of movement has applied to dentists since 1980, if their education has met the requirements of the Dental Directives.

The Dental Directives

The European Union Dental Directives (78/686 and 687 EEC) mean that any national of a member state who holds one of the recognized qualifications of dentistry may practice dentistry in any other member state. Under the European Economic Area agreement, Norway, Iceland, and Liechtenstein are also included. However, the list of qualifications does not include dental care professionals and they cannot therefore practice across Europe.

The Dental Directives outline that the course of training must be a minimum of 5 years in a university or university equivalent. The course must include theoretical and practical work and cover a list of prescribed subjects. Member states are not allowed to place restrictions on incoming dentists; for example, language requirements.

However, incoming dentists may be expected to comply with any restrictions placed on local dentists.

To practice in another country, dentists must register with the competent authority in the country in which they work; in the UK this is the General Dental Council. Each country has an information body that will provide details of the registration procedure. A full list of these is given in Kravitz and Treasure (2009).

Specific requirements relating to registration

- *Good character and good repute*: a certificate must be provided indicating that the dentist is of good standing in his/her own state. The new state may request an extract from the 'judicial record' or an equivalent document.
- *Serious professional misconduct and criminal penalties*: all information must be forwarded to the new state.
- *Physical and mental health*: some states require evidence of satisfactory health.
- *Duration of the authorizing procedure*: must be completed within 3 months of application. This period may be altered if there are any doubts about any of the above matters.
- *Alternative to taking an oath*: if an oath or solemn declaration is required in order to practice, an alternative must be offered if the former is inappropriate for the individual.

Specialization in Europe

To be accepted as a speciality, a discipline must be recognized in two or more member states. Currently, only two specialities meet this criteria, orthodontics and oral surgery. Training as a specialist must be on a full-time course of 3 years' duration in a university or otherwise approved establishment. The trainee must be individually supervised.

The criteria for both postgraduate and undergraduate study are the minimum training requirements

required to practice at that level. While a member state may impose additional criteria for qualifications acquired within its territory, it must not impose additional requirements on people gaining qualifications in other member states as they will have fulfilled the minimum requirements.

Dental practice in Europe

The practice of dentistry in each of the states of Europe is different, but there are some common themes. In Europe, dental care is provided mainly by 'general' or 'liberal' practitioners. Only in Scandinavia and Ireland are there more than 20% of dentists working in areas other than general practice. Access to oral health care is still largely determined by the distribution of dentists. Some governments and other bodies offer financial assistance, but this is usually limited to a standard package of care. Dentists are paid on a fee-per-service basis.

All countries have dental nurses, although they are recognized by a variety of names. Dental technicians are recognized in all countries and hygienists in most. However, only a few countries recognize any other type of auxiliary.

Kravitz and Treasure (2009), in their *EU Manual of Dental Practice*, include a chapter on every member state, describing the requirements for practice and the way in which dentistry is practiced in every member state.

DISCUSSION POINTS 1

If you were to move to another country to practice dentistry, what regulations would you need to make yourself aware of and how would you go about this?

Recent developments

The reforms of health care in Europe are based on two main themes: decentralization of the management of public services and higher patient charges (Holst *et al.* 2001). The degree to which any member state has autonomy over these moves is unclear. The limitations that European Union member states place on care entitlements to their citizens have been challenged in the European Court of Justice (Watson 1998) in two cases. These

cases arose from Luxembourg and sought the right for citizens of European Union member states to seek care in any of the member states. The first case covered optical services brought by Nicolas Decker, the second, an orthodontic case brought by Raymond Kohl. The court ruled that citizens of the European Union could seek care in any other member state. The implications of these cases may be far-reaching as governments attempt to limit the care entitlement to their citizens. Graduates of member states do not have to undertake vocational training to practice in the NHS in the UK but some wish to. They must be treated equally when seeking employment. This is currently a cause of controversy.

Conclusion

The European Union offers opportunities for dentists in education, research, and practice. European Union legislation is an influencing factor on the practice of dentistry and this is likely to become of greater importance as member states move closer together.

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Further reading

21 Planning dental services

CHAPTER CONTENTS

Introduction

Principles of planning

Joint Strategic Needs Assessment

Oral Health Needs Assessment

Quality of dental care and clinical governance

Conclusion

References

Further reading

By the end of this chapter you should be able to:

- Provide a definition of planning and outline the basic steps in the planning cycle.
- Describe the range of information needed in planning dental services.
- Define concepts of need.
- Define quality of health care.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- Overview of epidemiology (Chapter 5).
- Overview of health care systems (Chapter 17).
- Problems with health services (Chapter 23).

Introduction

Planning is an integral part of dental care provision that can operate at many different levels. At a national level, government NHS policy impacts upon dental services in different ways. For example, in the General Dental Service, patient charge bands in England are currently set by the government. In the future, at the national level, the National Health Service Commissioning

Board (NHSCB) will determine national policy and national delivery requirements. The NHSCB will be responsible for commissioning primary dental services and contractual arrangements with dentists. At the Health and Wellbeing Board (HWB) level in England, planners (in conjunction with general medical practitioner (GMP) consortia/clinical care commissioning groups (CCGs)) will make decisions over the priorities for local services, and the types and range of services offered locally. Within a dental practice, dental practitioners and their team members may develop a range of practice policies aimed at improving the services provided. Finally, every day clinicians develop treatment plans for individual patient care based upon their oral health needs. All these activities are planning in action.

This chapter will examine the basic principles of planning, and review the different steps in the planning process.

Principles of planning

At the most basic level, planning aims to guide choices so that decisions are made in the best manner to reach the desired outcomes. Planning provides a guide and structure to the process of decision-making to maximize

results within the limited resources available. Is planning really necessary when there are so many other demands on practitioners' time?

Planning can be justified for the following reasons:

- It provides an opportunity to be proactive in decision-making rather than constantly reacting to pressures and demands.
- It enables priorities to be set.
- It identifies where resources can be directed to have the greatest impact.

Various planning models have been proposed to act as a guide to the different steps in the planning process. The rational planning model provides a basic guide to the process (McCarthy 1982), and involves the following steps:

- 1 Assessment of need: e.g. identification of the oral health problems and concerns of the population.
- 2 Identifying priorities: agreeing the target areas for action.
- 3 Developing aims and objectives: the aim is the overall goal to be achieved, whereas the objectives are the steps needed to reach the aim.
- 4 Assessing resources: identifying the range of resources available to facilitate implementation of the plan; for example, personnel, materials, and equipment.
- 5 Implementation: turning the plans into action.
- 6 Evaluation: measuring the changes resulting from the plan.

In reality, planning is never straightforward. Information is often limited, there are pressures to focus on particular issues, and options may be restricted by a lack of resources. Often the potential for change is limited. A rational plan is therefore uncommon. Instead, an incremental approach to planning is how decisions are made. This involves making small decisions based upon circumstances, rather than grand plans for the future (McCarthy 1982).

In dentistry, different models and approaches to planning apply across the different service sectors. Within the Salaried (or Community) Dental Services

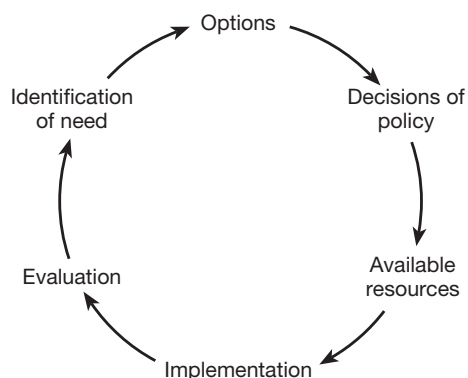


Figure 21.1 Rational planning model.

Reproduced from McCarthy 1982 with permission from the King's Fund.

and Hospital Dental Services, the rational planning model is used to a certain extent. In the General Dental Service, the dental practitioners need to plan how best to provide a good level of dental care, make a reasonable income, while also responding and meeting the contractual requirements of commissioners. Rational planning is therefore essential. In England, guidance has been provided to local dental commissioners on the elements to include in an Oral Health Needs Assessment (OHNA) (Primary Care Commissioning 2006), which is used to plan local primary and secondary dental care services and is described in the section **Implementing quality within dental services** (see Figure 21.1 for approach to use). Access to a range of types of information is required (see Figure 21.2) before informed planning decisions can be made.

Joint Strategic Needs Assessment

In England in 2013, the HWBs will be obliged, together with CCGs, to produce a Joint Strategic Needs Assessment (JSNA) and a Joint Health and Wellbeing Strategy (JHWS). HWBs and CCGs must also obtain input from the NHSCB. While the HWB and CCG will form the core personnel responsible for the JSNA and JSWS, local service providers, representatives from the local community, and voluntary sectors will also be included

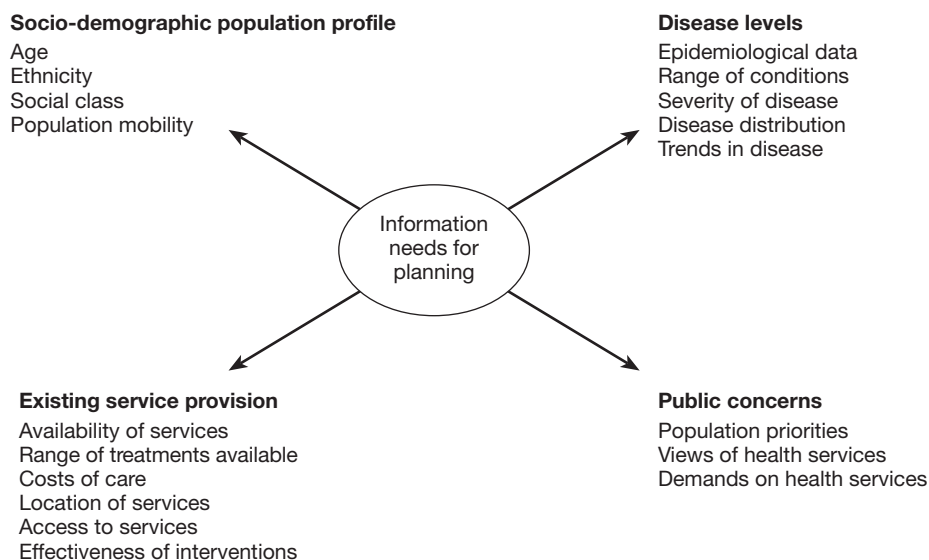


Figure 21.2 Basic information used in health planning.

in the process. The JSNA and JSWs are unique to the local population. The JSNA assesses and outlines local needs in relation to general and mental health, prevention and health protection, social service provision needs, configuration of health and social services, and gaps in service provision (Department of Health 2012). The JSWS will identify priorities and action points to take forward. It will also specify national and local outcomes against which progress can be monitored. Exactly how these arrangements will work and the process underpinning the development of these two core documents and how they will affect commissioning of health and social care services are still being reviewed at the time of writing. However, Figure 21.3 illustrates how it is anticipated HWBs and CCGs will take forward JSNAs and JSHWS.

which there is an effective and acceptable treatment or cure'. But it is also important that the individual has 'the capacity to benefit' (Culyer 1995) from treatment. Bradshaw (1972) has given us the terminology to describe different types of needs: *normative need* (professionally defined need), *felt need or wants* (patients' perception of their need, which is usually less than normative need), *expressed need or demand* (felt need translated into action, by using services or requesting information), and *comparative need* (assessed by comparing the health needs of similar groups of people). Carr and Wolfe (1979) define *unmet need* as the differences, if any, between health care that is judged as necessary for a population and the actual care provided.

Oral Health Needs Assessment

Defining and assessing need is a critical element of the planning process, and many definitions of need have been proposed (see also Chapter 3). Matthew (1971) provides a useful definition: 'need for medical care exists when an individual has an illness or disability for

DISCUSSION POINTS 1

Provide an oral health example of Bradshaw's concept of need for:

- normative need
- felt need
- expressed need
- comparative need

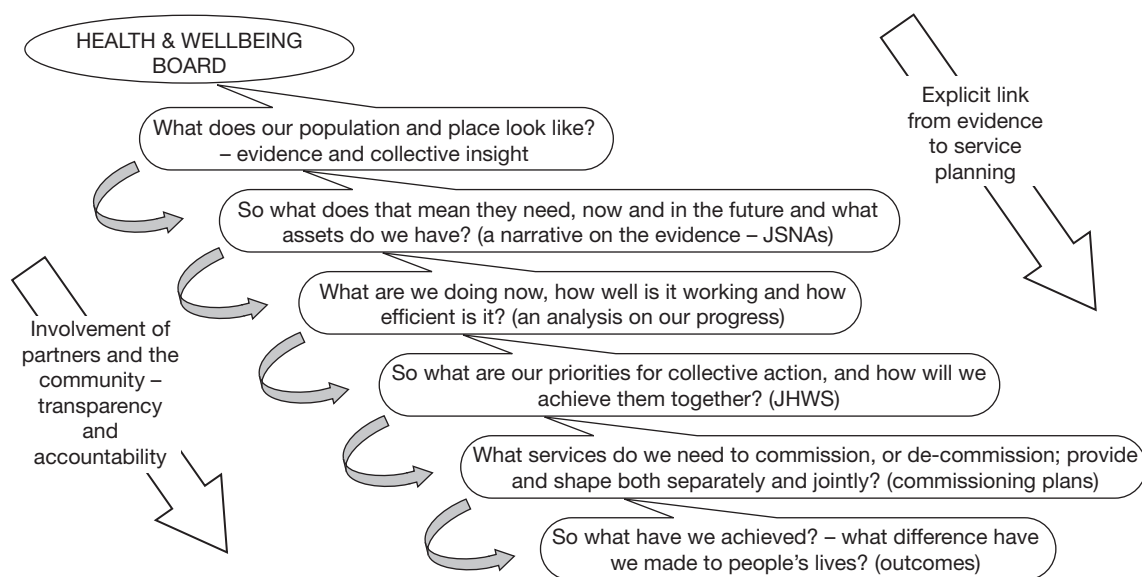


Figure 21.3 How JSNAs and JHWS and commissioning plans will fit together.

Reproduced from p. 39 Department of Health (2012). Joint Strategic Needs Assessment & Joint Health & Wellbeing draft guidance.

<http://media.dh.gov.uk/network/18/files/2012/01/JSNAs-and-joint-health-and-wellbeing-strategies-draft-strats.pdf>. Accessed 11 April 2013.

Traditionally, oral health services have been planned on the basis of information collected in normative assessments of need. Professionally determined bio-medical measures of disease such as DMF/dmf and the Community Periodontal Index (CPI) have been used extensively to determine oral health needs. Chapter 5 provides more detail on the epidemiological indices used in oral health measurement.

Assessing oral health needs solely based upon normative measures has, however, certain fundamental shortcomings:

- Normative assessments of need are not objective.
- Normative assessments of need do not provide any information on the impact of disease on an individual's function and quality of life.
- Normative assessments of need rely solely on professional judgements and the patient's felt needs are not accounted for.

Box 3.5 in Chapter 3 provides a summary of the limitations of normative need in more detail.

Impact of oral disease

Recognition of the limitations of professionally defined need have led to the development of broader measures of oral health. In 1988, Locker developed a conceptual model of oral health based upon the concepts of impairment, disability, and handicap (Locker 1988), which he anticipated would help tell dentists and planners more about the functioning of the mouth and symptoms. According to Locker (1988, 1996), assessment tools based on this model of health would estimate 'the extent to which dental and oral disorders disrupt normal social role functioning and bring about major changes in behaviour such as an inability to work or attend school, or undertake parental or household duties'. A range of measures have been developed since then (see Box 3.2 in Chapter 3), but they largely measure function and self-reported oral health symptoms. While they are often termed oral health-related quality of life measures, they tend to measure functional status rather than oral health-related quality of life (Locker and Allen 2007).

DISCUSSION POINTS 2

Given the data above, what actions might be possible in order to achieve some health improvements and to solve some of the problems? Consider preventive strategies and alterations to treatment provision that might assist.

What political, cultural, and social problems might you encounter?

Approaches to Oral Health Needs Assessment

When indicators of social and psychological impact have been compared with clinical variables, a generally weak association has been found (Sheiham and Spencer 1997). To fully assess oral health needs therefore requires clinical measures as well as a selection of social and psychological indicators.

DISCUSSION POINTS 3

Outline the range of ways in which oral diseases may have an impact on an individual's quality of life.

Sheiham and Spencer (1997) have developed an approach to Oral Health Needs Assessment (OHNA) which includes assessment of normative need, but also includes the perceived impacts of oral disease (impairment and social dysfunction), and behavioural factors. They argue that behavioural factors, such as people's propensity to carry out self-care and use dental care appropriately, are also important elements to assess, as these behaviours will influence the long-term outcomes of care and progression of disease. In addition, this approach to OHNA calls for the wants of the individual, and finally an estimation and prescription of effective and acceptable treatments to be included (Sheiham and Spencer 1997; Sheiham and Tsakos 2007).

The *socio-dental approach* is an approach that aims to integrate normative assessment of needs with impact of oral health measures to produce a *rational planning model*. For example Adulyanon *et al.* (1996) assessed impact-related treatment need using an OHRQoL measure (Oral Impact of Daily Performance (OIDP)) in a

sample of Thai adults. The authors found that the extent of treatment need was reduced from the level assessed using normative need, particularly for periodontal and prosthetic conditions. The use of this rational planning model means that the need identified has been mediated by the extent to which it impacts on people. In the Thai example, the impact of missing teeth was low, so while a dentist might routinely have prescribed a denture, many of the adults in this study would not have wanted a denture or derived a benefit from having dentures made. It is likely that they would not have worn the dentures, therefore using up precious resources that could have been spent elsewhere. The approach has also been used to assess the impact-related prosthetic treatment needs of dentate older adults (Srisilapanan *et al.* 2001) and in assessing children's impact-related orthodontic needs (Gherunpong *et al.* 2006).

The approach to an OHNA must be systematic and as much available evidence from different sources should be gathered. It is also important to decide the scope and focus of the assessment and gauge what might be the local priorities. The assessment should aim to assess: the oral health needs of the population (normative, felt, impact, and prevention needs); the existing capacity of local dental services to deliver dental care; and the potential for local delivery of dentistry to be redesigned and reconfigured to meet needs (Primary Care Commissioning 2006). Rational choices must also be made about priority areas to address. Box 21.1 illustrates the steps in OHNA for primary dental care commissioning in England (Primary Care Commissioning 2006).

This is an approach that is very much based on the English NHS dental care delivery system, but the principles underpinning the approach are important and useful.

Oral health priorities

The Steele review (Steele *et al.* 2009) set out three overarching principles that they felt should inform the delivery of an evidence-based dental service. It should (1) prevent oral disease and the damage caused, (2) minimize the impact of oral disease on health, and (3) maintain and restore quality of life when this was affected by oral diseases and the condition of the mouth. Based on

Box 21.1 Steps in undertaking an Oral Health Needs Assessment

1	Assess local needs	Census data and local demography, deprivation data, numbers and location of pre-school children, school-going children, people with disabilities, and vulnerable populations, older people (including community and residential settings, health equity assessment), adult and child dental surveys, impact of oral health, oral health of people with disability and vulnerable people, pattern of oral health behaviours, secondary care data, social care datasets, reports of overview and scrutiny committees, NHS Information centre dental statistics, dental practice adviser reports, CQC monitoring
2	Identify priorities of local commissioners	Local priorities will be driven by national and local delivery plans. Check national policies, such as <i>Choosing Better Oral Health</i> (Department of Health/BASCD 2009) and <i>Valuing People's Oral Health</i> (Department of Health 2007)
3	Review local dental care provision	Assess the current performance of local providers, detail workforce and skill-mix to inform capacity and need for capacity building, assess current delivery of primary dental care, special care dentistry, use of mobile dental surgeries and domiciliary oral health care (DOHC)
4	Map and analyse	Geographic mapping of deprivation against caries levels, other health status measures, and service levels can be useful in identifying areas of need and gaps in services
5	Views of stakeholders	Gather views of local stakeholders, such as dentists, dental care professionals, patients, and the public, and social care partners
6	Views of patients and service users	Gather views of patients and service users, including oral health concerns, barriers to care, e.g. perception of availability of services, acceptability, accessibility, accommodation, and costs, gaps in services, and impact of oral health
7	Views of other stakeholders	Gather views of other health care professionals
8	Synthesize unmet needs and priorities	Estimate current situation based on preliminary data
9	Map current provision and explore possibility for future provision	Collect data on current service provision in primary and secondary care, explore opportunities and willingness to expand, and reconfigure service. Assess local practices exploring premises, staff, and workforce mix
10	Synthesize data	Map current services by locality, by need, and by priority. Map future provision to current gaps. Establish a list of priorities and needs. In estimating priority, consider how common the problem is, capacity to benefit, and impact on inequality
11	Develop an action plan and oral health strategy	Develop an action plan, consult and communicate with key stakeholders, health and social care sectors, devise and implement the oral health strategy

Modified from Primary Care Commissioning (2006). http://www.pcc.nhs.uk/uploads/Dentistry/march_uploads/ohna_formatted_v1_final.pdf. Accessed 29 Sept 2012.

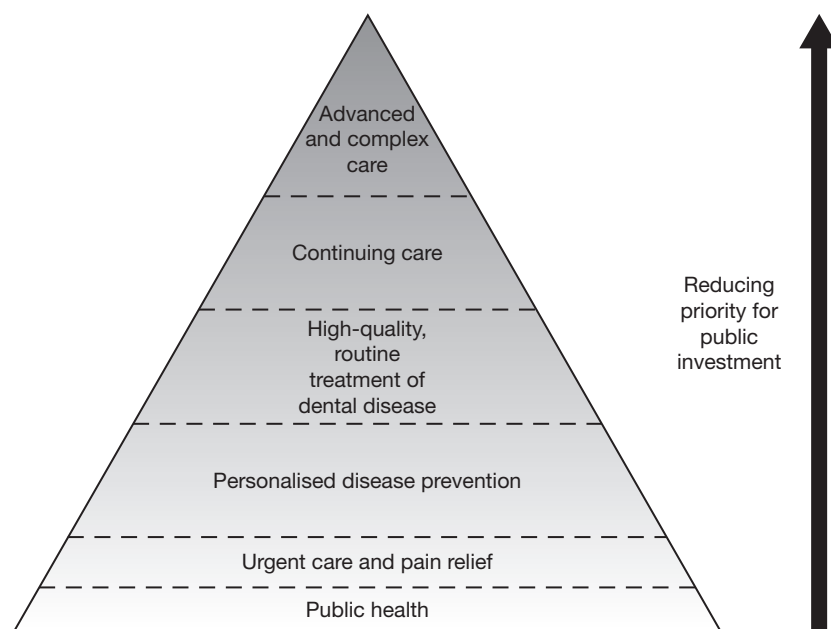


Figure 21.4 Priorities for public investment in oral health.

Reproduced with permission from p. 43 Steele *et al.* (2009). NHS Dental Services in England: An independent review led by Professor Jimmy Steele. http://webarchive.nationalarchives.gov.uk/20130107105354/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_101180.pdf. Accessed 11 April 2013.

these principles, Steele *et al.* described a set of priorities for delivery of dental care with the goal of achieving long-term oral health. This list of priorities for public investment in oral health is illustrated in Figure 21.4.

Key to the investment for long-term health and the first priority is investment in public health which would ensure patients and the dental profession would be supported in minimizing risks to oral health. Steele *et al.* (2009) also highlighted the need for access to services for urgent relief of pain and infection. The third priority continues the public health focus by calling for investment in effective personalized dental disease prevention, as the prevention of irreversible damage ‘represents a lifetime saving in consequences and costs’. The fourth priority focuses on evidence-based treatment of disease, using minimally invasive techniques and minimizing damage and need for retreatment. The fifth priority focuses on facilitating continuity of care and regular maintenance by establishing long-term care relationships between patients and their dentists and the dental team. The final priority accepts that a few people will need advanced and complex care, but it

Box 21.2 Life-time focused oral health service

- Prevent oral disease and the damage it causes.
- Provide urgent and prompt care when needed.
- Minimize impact of disease when it occurs by providing evidence-based minimally invasive dentistry, personalized prevention, and access to continuity of care and maintenance.
- Provide treatment to maintain and restore quality of life, subject to a stable oral environment and preset criteria appropriate to resources available.

(Modified from Steele *et al.* (2009). *NHS Dental Services in England: An independent review led by Professor Jimmy Steele*. http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_101180.pdf. Accessed 23 Sept 2012.)

should not be regarded as an automatic right. It should be offered on the condition of a stable oral environment, where dental need and benefits are greatest. Box 21.2 summarizes Steele *et al.*'s (2009) view of the characteristics of a life-time focused oral health service.

Box 21.3 Local oral health planning example

The following is based on an actual example in an English town and provides a 'real life' situation in which planning decisions and processes were implemented. Elements of the plan have been altered to make points for illustration.

Needs assessment

The routine epidemiological survey of 5-year-old children was used to map the disease level across the town.

Description of population

The town had a population of around 100,000 people. Due to the closure of various industries in previous years, unemployment was above the national average.

An area of the town was inhabited almost entirely by people of Bangladeshi origin. The majority of the adults in this area were first generation and many of the women did not speak any English. This community was within easy walking distance of the town centre, supermarket, and general dental practitioners. However, the religion of this community was Islam and, although the mothers took the children to school, they were not permitted to leave the house for other reasons.

There was a large housing estate on the periphery of the town where unemployment was very high, and it was recognized as one of the most deprived areas within the

region. There were also some areas of commuter-belt housing that were relatively advantaged.

The entire population received fluoridated water.

Resource assessment

The distribution of general dental practitioners was mapped on top of the disease levels, as was the current deployment of Community Dental Service (CDS) staff. At the start of the process there were no problems for adults in accessing general dental practitioners, as all were accepting new adult patients.

Defining the problems

There was a very high level of decay, untreated, among the children of Bangladeshi origin. Uptake of services in this community was low. There was a similar but less severe problem in the deprived housing estate. However, the previous year's survey had shown this estate to have very high disease levels in 12-year-old children. The general practitioner and the community dentist were both well accepted by the population but were both working to capacity.

The CDS was experiencing a time of financial restriction, with cuts being planned every year. Any plan had to be, at best, resource neutral. Resources available to the CDS were the three dentists working in the town and two dentists and one therapist working outside of the town. There were two mobile dental units.

Box 21.3 presents some findings from an English town and provides 'real-life' data from which planning decisions and processes are implemented. Review the data in Box 21.3 and list what you think are the three local service priorities for dental services. Now attempt

to do the same for your local area as described in Discussion Points 4.

DISCUSSION POINTS 4

Each HWSB is required to have a JSNA and JHWS. Find the JSNA and OHSNA for your local area and assess it against the criteria outlined in Box 21.1. Based on your reading of the JSNA and OHSNA, what would you say are the three local service priorities for dental services in your area? What changes in service provision would you suggest in your area?

Quality of dental care and clinical governance

One of the key elements in planning dental services is to ensure that the quality of care provided is of the highest quality. In health services throughout the world, efforts are being employed to examine the quality of services and identify opportunities for improvement. In the UK, clinical governance is a key government priority for the development of the NHS (*Standards for Better Health*, Department of Health 2006). Clinical

governance is an on-going programme aimed at changing the culture of the whole NHS and improving the quality of its services. Scally and Donaldson (1998) define clinical governance as a continuous improvement in the quality of services, where high standards of care are safeguarded by creating an environment in which excellence in clinical care flourishes.

Key components of clinical governance include:

- clear lines of responsibility for the quality of clinical care;
- a comprehensive programme of activity that improves quality;
- clear policies for managing risk;
- procedures for all health care professionals to identify and remedy poor performance.

For the busy dental team, this will involve finding out about good clinical practice, appraisal of the literature (see Chapter 7), evidence-informed practice, quality improvement, and monitoring. It will also involve performance management of the dental team, appraisals, continuing professional development and training, risk assessment and management, adverse event reporting, and patient complaints protocols. Clinical governance is a process with the requirement from regulators to show evidence of the process.

Governments, funding organizations, and the public expect, and increasingly demand, reassurance that quality issues are being reviewed and maintained within health services. Quality of care is and will remain a central issue for all health professionals. However, what do we mean by 'quality', and in what ways can this be examined and improved upon?

Definitions of quality

Before considering methods of improving the quality of a service, it is important to have an agreed definition of quality.

Defining quality of health care involves a range of different things and is not an easy task. When clinicians are asked to propose a definition of quality they tend to concentrate very much on the technical and scientific elements of treatment. These, of course, reflect the

nature and focus of professional training and expertise. However, from a public health perspective, quality of dental care encompasses much more than the cavosurface angle in a cavity preparation, or the precision of a marginal ridge in a restoration. Defining quality of care is not the sole prerogative of clinicians; users of services and health services managers and planners also have an important contribution to make. Maxwell (1984) has proposed a definition of quality in health services that has been widely accepted as reflecting the breadth and complexity of this topic.

The definition has the following components:

- *Effectiveness*: that services achieve their intended benefit; for example, that orthodontic treatment produces a long-term, sustained improvement in malocclusion.
- *Access*: that the services are easily available to users in terms of time, cost, distance, and ethos; for example, ensuring that different users of services, such as disabled people, can utilize dental care.
- *Socially acceptable*: that services are provided to satisfy the reasonable expectations of users, providers, and the community; for example, in areas where English is not the first language of many people, services should recognize this and provide information and resources in an appropriate language and format.
- *Efficiency and economy*: that the services achieve maximum benefit for minimum cost; for example, by limiting wasteful use of materials and equipment.
- *Relevance to need*: that the service is what the users actually need; for example, that the dental services provided reflect the needs of the local population, such as prosthetic care for an area with a large number of older people.
- *Equity*: that services will be fairly directed to those in need; for example, dental services should be available to all groups in society, not just those with private health insurance.
- Another popular definition of quality was proposed by the Royal College of General Practitioners (1985) when they reviewed what would be the core features of a high-quality service provided by a general medical practitioner. This definition has more of a clinical focus and encompasses the following features:

- *Interpersonal skills*: the ability to communicate effectively with users and colleagues is an essential component of clinical practice.
- *Clinical competence*: the ability to perform core clinical tasks to a sufficient standard to ensure the effective and safe delivery of appropriate care.
- *Professional values*: this recognizes the importance of ethical and professional principles relevant to the delivery of health care. These include respect for clients' rights and autonomy, justice, beneficence, confidentiality, and privacy.
- *Access*: the ability of clients to utilize and benefit from care is a fundamental requirement.

Donabedian (1974) describes quality of health care as having three interrelated elements: structure, process, and outcome:

- *Structure* refers to the physical elements of care, such as the facilities, equipment, and premises.
- *Process* involves all the various ways in which the system deals with people using the service. This includes the clinical techniques employed, the administrative and management systems, and the appointments procedures.
- *Outcome* refers to the consequences of contact with the service; in other words, what has changed as a result of using the service. For example, has the toothache stopped?

More recently, Lord Darzi (2008) described the quality requirements of the NHS as: safety, effective treatments, and patient care characterized by compassion, dignity, and respect.

Steele *et al.* (2009) called for a focus on quality that looked at not only the *technical* effectiveness of care provided, e.g. longevity of restorations, but also the effectiveness of prevention provided: 'If we are successful in communicating with patients about decreasing their risk of oral disease, then we should be able to provide evidence for that, through more patients moving on to continuing care and more returning patients whose risk is lowered'.

Whichever definition of quality is used, it is very important that it encompasses the range of potential concerns of clinicians, service users, and health service managers.

Implementing quality within dental services

From 2011, all dental practices in England were required to register with the Care Quality Commission (CQC). The CQC has the remit of registering all health and social care providers, monitoring and inspecting providers, and imposing fines or forcing closure if quality standards are not met. It also has responsibility for patients detained under the Mental Health Act and Legislation Related to Safeguarding Adults (ensuring patients are treated with respect and dignity). This oversight of quality is complemented by the quality and clinical governance frameworks operated by the dental team within the practice setting.

The benefits of the frameworks are as follows: they bring all quality assurance processes under one umbrella; systems and processes are clear, transparent, and accountable; lines of responsibility are made explicit; risk management is proactive and explicit; and the whole team is involved in the process. Clinical governance is an extremely detailed process that is ongoing. There are two key aspects: (1) setting standards and clinical policy; and (2) monitoring and implementation of clinical policy and standards. The Primary Care Commissioning (2006) outlined a clinical governance framework for commissioners to assess primary dental practices' compliance with clinical governance, identifying eight key dental themes (presented in Box 21.4).

For each theme, the sources of evidence and guidelines were provided and key requirements for compliance

Box 21.4 Themes of clinical governance

- Infection control
- Child protection
- Dental radiography
- Staff–patient public and environmental safety
- Evidence-based practice and research
- Prevention and public health
- Clinical records, patient privacy, and confidentiality
- Staff involvement and development for all staff

Modified from PCC (2006). *Dentistry Clinical Governance Framework Work Book*. Primary Care Commissioning.

were identified, e.g. for the infection control theme, all new staff inductions must include infection control procedures and staff training. The framework workbook also required the person/persons affected by the theme to be identified, indicators for the compliance requirements, and written evidence of compliance.

Improving the quality of dental care is a challenging and time-consuming process. It requires clinicians to critically appraise their own performances and to share their expertise and knowledge with colleagues. Continuing professional development, peer review, and clinical audit are all elements of clinical governance (Department of Health 2006).

The audit cycle provides a useful structure to follow when considering the best means of improving service performance. Figure 21.5 provides a diagrammatic outline of the different steps in the audit cycle.

When establishing a quality team, it is essential that ground rules are agreed in order to promote trust, understanding, and respect. Issues such as confidentiality need to be addressed and procedures agreed. Initially it is best to focus on relatively straightforward areas for review. Once confidence and expertise are

developed, more challenging areas of practice can be tackled.

Setting and agreeing standards of care is a critical step in the audit process. This can be a very time-consuming and difficult task, especially reaching a consensus view. Gaining access to the scientific literature and existing published professional guidelines can facilitate the task of setting clear, precise, and up-to-date standards of care.

Probably the most problematic step in the audit cycle is developing and implementing the system of monitoring practice against agreed standards of care. Set criteria need to be developed to measure practice performance once the quality standards are agreed. These criteria must be objective, reliable, and rigorous. When practice is compared with the set standards and found to be inadequate, appropriate action needs to be taken. In most cases this may involve accessing training and support, or changing certain types of equipment or materials used.

Reviewing the value of the quality system is essential in ensuring that it provides real benefits to all members of the team and, most importantly, to the service that is delivered to practice users.

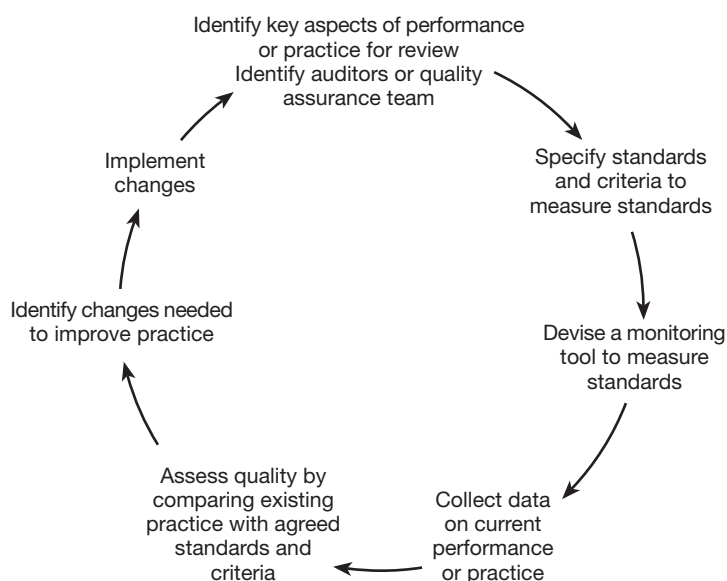


Figure 21.5 Quality assurance cycle.

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Conclusion

Within a constantly changing world, planning is an essential activity to ensure that dental care responds and develops appropriately to the new challenges presented. Assessing need is at the core of planning. It is critical that any needs assessment encompasses a broad definition of need. Socio-dental measures of oral health provide a useful means of assessing the impact of oral diseases on individuals and communities. Internationally, health services are striving to improve the quality of care provided. Within dentistry, clinical governance mechanisms are now being introduced that seek to review and implement improvements in the standards and quality of dental care. Again, it is important that any efforts to improve quality of care encompass a broad and balanced definition of quality which includes the perspectives of clinicians, service users, and health service managers.

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22 Health economics

CHAPTER CONTENTS

Introduction

When is economic evaluation appropriate?

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Further reading

By the end of this chapter you should be able to:

- Understand the reasons why health economics are part of modern health services.
- Understand the main types of economic analyses.
- Have an overview of how NICE uses QALYs in economic analyses.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- Determinants of health (Chapter 2).
- Overview of epidemiology (Chapter 5).
- Evidence-based practice (Chapter 7).

Introduction

Haycox (2009) describes economics as the science of *scarcity*. Economics analyses how choices about scarce goods and services are structured and

prioritized by individuals in order to maximize welfare (Haycox 2009).

Should economic theory have any relationship to health and health care? Clinicians will often state that they make their decisions based on their clinical judgement (what is best for the patient in front of them) and that they should not be influenced by concerns over money. Is this view entirely valid?

Despite the improvements in health seen in the majority of countries, costs of health care have continued to rise above the general rate of inflation. For example, in the USA, health care costs account for 15% of Gross Domestic Product (GDP), compared to 17% in the UK (Morris *et al.* 2007). This is due to a number of factors, such as the price of materials, personnel salaries and wages, and the ever-increasing use of more advanced technology. There is little evidence, however, that the increased spending has contributed to better health (Abel-Smith 1996). Indeed, the evidence from Chapters 2 and 4 suggests that health will not be improved just by spending more money on health care.

There is a growing awareness that health care resources are finite, while the demand for health care is apparently infinite (Cohen 2008). Economic analysis provides a systematic framework for answering questions about the justification for using these finite and scarce health resources and helps identify solutions to some common problems in health care (Morris *et al.* 2007). Health economics is therefore the study of the application of economic theory to decision-making about health and health care (Mooney 2003; Morris *et al.* 2007). In this context, health care decision-makers must prioritize choices about interventions informed by an analysis of both the costs and the benefits (Haycox 2009). Getting *value for money* involves a desire to achieve a health goal at the least cost or a desire to maximize benefits to patients where there is a limited pot of resources (Haycox 2009).

A key concept is the *opportunity cost of a programme*, which can be described as the value of the resource when it is put to its best alternative use (Cunningham 2000). Resources are diverted from somewhere else; therefore an opportunity or a benefit is foregone (Morris *et al.* 2007). Economic analysis compares the opportunity cost (resources used by a particular programme that have other potential alternative uses) with the cost of the improvement in health produced by a particular programme. Another key concept in economics is the notion of *efficiency*, which maximizes the benefits from available resources (Cohen 2008). There are two aspects to efficiency according to Haycox (2009, p. 2): *allocative efficiency* measures the extent to which there is optimal allocation of resources to individuals and populations who can benefit the most; and *technical efficiency* is the effectiveness with which resources are used to achieve a maximum outcome or the minimum amount of resources that can be combined to give a desired outcome.

Health economics is, therefore, about informing resource management—what is affordable and desirable and what is not. When resources are scarce, decisions need to be made as to how best to prioritize and to allocate them to maximize value for money. If

resources are scarce then it is usually not possible to provide all the care that is desired, and some form of rationing is introduced.

DISCUSSION POINTS 1

Why might rationing be controversial within the health system?

When is economic evaluation appropriate?

Consider the question: What is the best way of preventing dental caries? Is it through using self-applied fluoride toothpaste or professionally applied fluoride rinses? These are very wide questions and there are a variety of answers. Does the question mean: Which produces the greatest reduction in dental caries, or which is more acceptable to the public, or which is cheaper? There are many factors involved in answering these questions and economic evaluation should be considered as only one of a number of approaches. Drummond *et al.* (1997) stated that economic evaluation should come after three other questions are asked of any intervention. These questions are:

- Can the intervention work?
- Does it work in a real-life situation?
- Does it reach those whom it is meant to reach?

The important and underpinning relationship between health economics and evidence-based practice forms the basis for Drummond's first two questions. Once the effectiveness of an intervention has been determined, economics may then help in deciding between two or more interventions.

Economic analyses according to Drummond *et al.* (1997) are concerned with assessing two major factors: inputs (or costs) and outputs (or outcomes and the consequences of actions). The weighing up of costs and benefits is then used to help health care decision-makers make informed choices about interventions that will give the best outcomes.

Inputs

To undertake an evaluation, the inputs or costs need to be identified. These are the resources consumed and they can be divided into three types:

- **Direct costs:** these are largely based in the health sector, and include salaries and consumables. In a fluoride rinse programme, the costs would be of the rinse used and the health care personnel involved. However, it might be that the rinse was supervised by teachers in schools and then the salary costs would be incurred by another sector.
- **Indirect costs:** also known as production losses, these occur when someone cannot attend work while receiving therapy. Travelling time and loss of time from school are other examples. The indirect costs would be higher if someone had to attend a surgery for a fluoride application compared with applying the fluoride themselves at home.
- **Intangible costs:** these include pain and suffering, and are difficult to measure. Socio-dental indicators have been developed as a way of trying to measure the impact and cost of dental diseases (Locker 1989). In oral diseases, where the majority of disease processes are chronic, these costs may be large.

Outputs

The changes in health also need to be measured. As discussed in Chapter 3, this will depend on the definition of health used. In health economics, the measures that are used depend upon the type of analysis that is being undertaken. Three types of outcome are used:

- **Natural units:** these are used in cost-effectiveness studies, for example tooth surfaces saved.
- **Utility measures:** these are measures of an individual's preference for a particular health outcome (Haycox 2009). Measures can be of enhanced survival (adding years to life) and enhanced quality of life (adding life to years). Quality-adjusted life years (QUALYs) are used in cost-utility studies. These are calculated by using life-years gained by an intervention weighted by the values that people place on different states of health. A value of 0 = death while 1 = optimal health.
- **Monetary units** (dollars or pounds): these are used in cost-benefit analyses.

In order to make comparisons, a considerable amount of information is needed. As a first step, it is necessary to identify whether there are two alternatives that can be compared, as illustrated in Figure 22.1. Only by having as complete information as possible can a full range of analyses be undertaken.

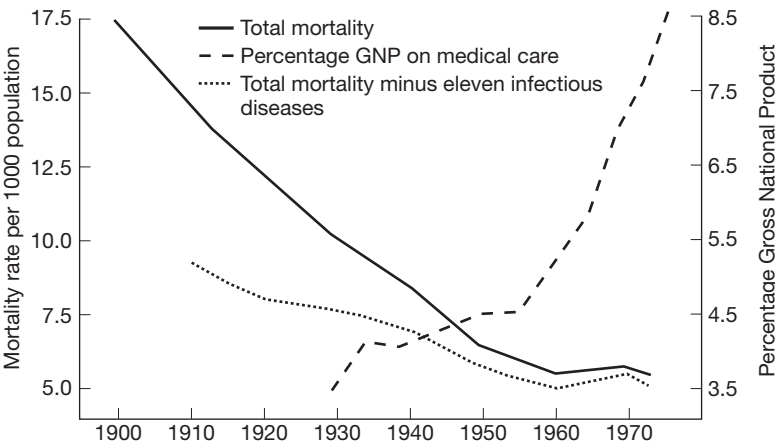


Figure 22.1 Age- and sex-adjusted mortality rates for the USA (1900–1973) (including and excluding eleven major infectious diseases) contrasted with the proportion of Gross National Product expended on medical care. Reproduced from McKinlay and McKinlay (1977). The question contribution of medical measures to the decline in mortality in the United States in the twentieth century. *MMFQ*, 55, 406–28.

Types of economic analysis

The different types of economic analyses are presented in Table 22.1, showing how each type of analysis defines and measures the effects (consequences) of an intervention or programme.

Cost effectiveness

Cost effectiveness analysis can be used to compare any intervention with any other intervention, provided the *same outcome* measure is used. In dentistry it would be a very appropriate methodology to use when comparing different types of preventive treatments. The unit of measurement would be tooth surfaces saved per year. Thus it is possible to compare different types of intervention, for example fissure sealants with fluoridated toothpaste, where the outcome (here number of tooth surfaces) can be measured using the same units. The level of effectiveness is different, as are the costs, but a cost per unit saved can be calculated and comparisons can therefore be made. This approach will tell us about technical efficiency, i.e. the

best way to prevent tooth surface decay; it will not tell us about allocative efficiency, i.e. is it worth doing, or are those with greatest capacity to benefit receiving the intervention?

Cost utility

To overcome the concerns of expressing all benefits in terms of money, an alternative measure is used which is the concept of utility. Cost utility analysis assesses the effect of an intervention on morbidity and mortality (Haycox 2009). The presumption is that interventions will either extend life or improve the quality of life, or a combination of both (Cohen 2008).

Utility means the preferences people or society have for a set of health outcomes. Different people value different health states in different ways. Imagine the situation where two people suffer from lingual anaesthesia following the removal of a lower third molar. One person is a tea taster while the other is a nurse. The impact upon the life of the tea taster is going to be significant in terms of her ability to function at work. She is therefore going to rate the effect of the treatment markedly worse on a scale

Table 22.1 Measurement of costs and consequences in economic evaluation.

Type of study	Measurement/valuation of costs in both alternatives	Identification of consequences	Measurement/valuation of consequences
Cost-minimization analysis	Dollars	Identical in all relevant respects	None
Cost-effectiveness analysis	Dollars	Single effect of interest, common to both alternatives, but achieved to different degrees	Natural units (e.g. life-years gained, disability-days saved, points of blood pressure reduction, etc.)
Cost-utility analysis	Dollars	Single or multiple effects, not necessarily common to both alternatives	Healthy years or (more often) quality-adjusted life-years
Cost-benefit analysis	Dollars	Single or multiple effects, not necessarily common to both alternatives	Dollars

Reproduced from Drummond *et al*, *Methods for the Economic Evaluation of Health Care Programmes*, 2005, with permission from Oxford University Press

of 0 (dead) to 1 (perfect health/utility) compared to the nurse, as it will interfere with her work far more.

Utility analysis allows for quality of life measures to be incorporated as well as the costs and outcomes in different programmes. The usual outcome measure in which all of these values are expressed is QALYs (adding life to years). Some work has also been done using the measure quality-adjusted tooth years QUATys.

Cost–benefit

Cost–benefit analysis assesses whether something is worth doing and addresses the concept of allocative efficiency (Cohen 2008). Cost–benefit analyses put a monetary value on both the costs and benefits. It allows schemes in different areas of health and outside health to be compared. Costs include all direct and indirect resources that may have opportunity costs, and benefits are everything of value that results (Cohen 2008). Sometimes it is desirable to compare interventions with more than one outcome. For example, it may be considered desirable to compare the cost per surface saved *and* the reduction in the amount of toothache for two interventions.

Cost minimization

In health economics, the term cost minimization has a specific meaning, but it also has another meaning in everyday use. It is important to understand which

meaning is implied. Economic cost minimization analyses are a specific type of cost-effectiveness study. The outcomes of the programmes being compared are tested through controlled clinical trials, ideally running concurrently. In cost minimization analysis the clinical outcomes for the interventions are the same (equivalent). Therefore only the costs need to be compared. The intervention with the lowest costs (cheapest) would be selected, but these analyses are rare as the outcomes between programmes are rarely identical.

The common use of the term refers to reductions in expenditure. For example, a hospital that needs to balance its budget may refer to the closure of a ward or the alteration of services as ‘cost minimization’. This is not an economic analysis. See Figure 22.2.

How NICE uses QALYS

The assessment of relative cost-effectiveness is an important component of whether a therapy is approved by NICE (Philips 2009). NICE uses cost utility analysis where the outcome of interest is the QALY. This allows comparisons across therapeutic areas. The £ per QALY is the currency used for comparisons (Phillips 2009). If a treatment costs more than £20,000–30,000 per QALY, then it would not be considered cost effective. Box 22.1 illustrates how NICE uses QALYs to compare a new drug against the standard care.

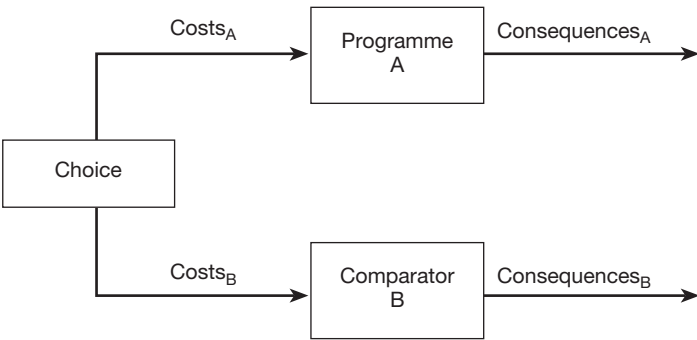


Figure 22.2 Comparative analysis of alternative courses of action in economic evaluation. Reproduced from Drummond *et al.* 1997.

Box 22.1 How NICE uses QALYs

Patient X has a serious, life-threatening condition.

- If he continues receiving standard treatment he will live for 1 year and his quality of life will be 0.4 (0 or below = worst possible health, 1 = best possible health).
- If he receives the new drug he will live for 1 year 3 months (1.25 years), with a quality of life of 0.6.

The new treatment is compared with standard care in terms of the QALYs gained:

- Standard treatment: 1 (1 year's extra life) \times 0.4 = 0.4 QALY
- New treatment: 1.25 (1 year 3 months extra life) \times 0.6 = 0.75 QALY

Therefore, the new treatment leads to 0.35 additional QALYs (that is: 0.75–0.4 QALY = 0.35 QALYs).

- The cost of the new drug is assumed to be £10,000, while standard treatment costs £3,000.

The difference in treatment costs (£7,000) is divided by the QALYs gained (0.35) to calculate the cost per QALY. So the new treatment would cost £20,000 per QALY.

Reproduced with permission from NICE 2010. Measuring effectiveness and cost effectiveness: the qaly. <http://www.nice.org.uk/newsroom/features/measuringeffectivenessandcost-effectiveness/qaly.jsp>. Accessed 11 April 2013.

How health economics differs from other economic evaluations of goods and services

In economic theory, the consumer has a central position in the evaluation of goods and services. It is not possible to *trade* health, but it is possible to buy and sell health services (McGuire *et al.* 1988). Economic evaluation of health care differs from other economic evaluations of goods and services in four key aspects (Cunningham 2000; McGuire *et al.* 1988; Mooney 2003):

- 1 There is an assumption that a consumer makes a choice after receiving information. However, consumers are not always able to collect or process information in relation to health care.

- 2 The person providing the information is usually the supplier of the health care. This does not happen in other fields.
- 3 There is an assumption that once health care is consumed, benefits in terms of improvements in health status will occur. People will respond differently to health care and full recovery is not always possible.
- 4 It is assumed that health is the only outcome of value for consumers. Consumers do not voluntarily engage in consuming health care. However, it has been argued that this may not be the case for dentistry (Cunningham 2000).

Health economics in dentistry

One of the major problems in dentistry is taking the results of a clinical trial and trying to turn that into a lifetime benefit from an intervention. For example, if it is known that using fluoridated toothpaste will reduce carious surfaces by of 0.8 surfaces per year in children aged 12–15, what will be the benefits over the next 15 years compared with restoring these surfaces?

Some of the problems with extending this example beyond the 3 years would include taking account of factors such as the changes in caries incidence over this time, the failure rate of restorations, and the value people place on restored surfaces compared with sound surfaces. Many of these factors are just not known. There is evidence both on how long restorations last in clinical trials and how frequently they are replaced in real-life situations (Chadwick *et al.* 1999), but these two figures are very different. When this happens, it is sensible to repeat the analyses using different estimates of inputs; this is known as undertaking sensitivity analyses. The likelihood of the accuracy of these estimates depends upon the validity of the data, which in some cases may be as little as an educated guess! These factors need to be acknowledged in the reporting of the results. Particularly in an example where you are trying to predict the life-long benefit of a preventive example, the results will become more speculative the further from the clinical trial results you move.

DISCUSSION POINTS 2

Discuss the example in the previous paragraph. Start by making a list of inputs and outputs as described, and then try to make a list of the factors that would be included.

Conclusion

Health economics can be a useful tool to help assess the value of different interventions. In dentistry, the number of robust studies using these techniques is relatively small and generally limited to preventive techniques. As with many tools, health economics is limited by the quality of the data available to put into the analyses. Health economics cannot provide a complete answer as to which intervention to use, but it can provide a systematic intellectual framework from which informed choices can be made.

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23 Problems with health care delivery

CHAPTER CONTENTS

Introduction

Common problems with health care delivery

Access problems

Access problems and dental care

Approaches to improving access for underserved groups and populations

Adherence and communication problems

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Useful websites

By the end of this chapter you should be able to:

- Describe the common problems with health care delivery.
- Define the term 'access to care'/'barriers to care'.
- Briefly outline how the barriers to accessing dental care might be overcome for underserved groups and populations.

This chapter links with:

- Introduction to the principles of public health (Chapter 1).
- The structure of the NHS in the UK (Chapter 18).
- The structure of dental services in the UK (Chapter 19).
- Planning dental services (Chapter 21).

Introduction

Earlier chapters have highlighted the influence the medical model of health has had on both the philosophy of health care and the structures devised to deliver

health care including dental care. The overriding influences of the medical model are the downstream focus on treatment of disease and the communication gap caused by differing concepts of health and need held by lay people and health professionals. Problems with health care delivery operate at a macro level (i.e. overall policy for and structure of health care) and at a micro level (how health care is delivered, one-to-one communication, and interaction with the patient and members of the dental team). Chapter 18 has described some of the specific problems with health care at the macro level. In this chapter we shall also look at some of the problems with how health care is delivered and problems with health services at the level of the user and the provider of health care.

Common problems with health care delivery

What should good health care look like? Maxwell (1984) defined six characteristics of a high-quality health care. Services should be equitable (fair), accessible,

relevant to health care needs, effective, efficient, and socially acceptable. There are recognized inequities in how health care is distributed; urban areas are often better provided for compared to rural areas, and hospital-based health care consumes more resources than community-based care. Not everyone has equal access to health care; for example, people living in deprived communities with greater health need have fewer doctors and dentists compared to richer areas with fewer health care needs. This phenomenon has been described as the *inverse care law* (Tudor Hart 1971).

Uncomfortable choices and rationing have to take place in allocating health care resources. Ideally, these decisions should be based on the greatest health need (and the capacity to benefit) rather than who has the loudest voice. The focus on treatment inherent in the medical model of health means that resources are spent on high-technology medicine and hospitals, while programmes to prevent disease are poorly supported and resourced. There is an expectation that there will be a magic bullet for every health problem, yet most chronic diseases have no cure. People learn to adapt and cope with their chronic illness rather than recover. While treatment of disease is an important part of health care, it should be remembered that patients will also have prevention needs and continuing care needs (e.g. supporting people to cope with and adapt to their chronic illness). Health care will always have a focus on treatment, but there needs to be an appropriate mix of care, prevention, and cure.

Health care consumes huge amounts of resources. The dominance of the medical model and the race to build large hospitals and find ever-better medicines and better technology blinded people to the important questions: Are people healthier as a result of spending on health care? and Is health care effective and efficient? Consider the critique of medicine provided by Cochrane (1972), McKeown (1976), and others described in Chapters 1 and 7. Deciding whether health has improved is complex. First, health has to be defined; second, there is a need to choose an indicator of health status that will allow the measurement of change; and third, any change in health status

needs to be linked to an antecedent health care intervention within very strict limiting criteria. One of the biggest problems with determining whether health care is effective and efficient is omitting to specify clearly what the health goal (outcome) is going to be. Put simply, *If we don't know where we want to be, how do we know when we get there?* The health goals for any programme or intervention should be specific, measurable, appropriate, realistic, time-related, and important (SMARTI). They should also be challenging so there is an incentive and drive for health care providers to do better. Chapter 1 suggests that despite all the money spent on health care and the improvements in health care, huge health inequalities have persisted.

Plamping (1988) summarizes some of these macro and micro problems in relation to health care delivery. The micro level problems are at the level of how health care is delivered (access issues) and at the patient–dentist interface (communication and adherence issues). See Box 23.1.

Box 23.1 Common problems with health care delivery

Macro level

- Treatment focus
- Unclear goals
- Maldistribution of resources
- Structure and configuration of health care services
- Lack of accountability

Micro level

- Communication problems
- Adherence with dental advice
- Access to dental care

Modified from Plamping 1988.

DISCUSSION POINTS 1

Look at the problems identified in Box 23.1. Think of examples of each 'problem' you have heard about or experienced personally.

Access problems

Access to health care is a complex issue and there have been a number of definitions, theories, and approaches to explaining access. Access should be seen as a continuum that involves a number of steps (which do not necessarily occur sequentially) and phases (Figure 23.1). The first phase involves a person perceiving a need, identifying a source of care, and then gaining entry into health care; the second phase involves obtaining health care and achieving a desirable outcome (Gibson *et al.* 2001). The first phase is influenced by sociological and psychological factors that determine whether a person will make contact with health services. In this phase a person must first perceive a need. In Chapter 3, the *clinical iceberg* was discussed which showed that many patients were unaware that they had a normative need. Some wearers of full dentures, for

example, believe that they have no dental needs once all their natural teeth have been removed. Many people with advanced periodontal disease are unaware of its presence because it is relatively symptomless. Box 3.6 in Chapter 3 also described the various sociological and psychological factors that influenced whether a need was perceived and then expressed. Examples included how culture can affect a person’s response to symptoms, and how people’s beliefs, attitudes, expectations, and definitions of illness can affect service use. Once a need is expressed, a source of health care needs to be identified and then accessed. These two steps are influenced by how health care is organized, how it is distributed geographically, and a person’s ability to pay. Assuming the person has overcome the psychosocial barriers to access, the second phase is the ‘fit between the health care service and the patient’. Factors influencing this relate to how health care is organized and costs.

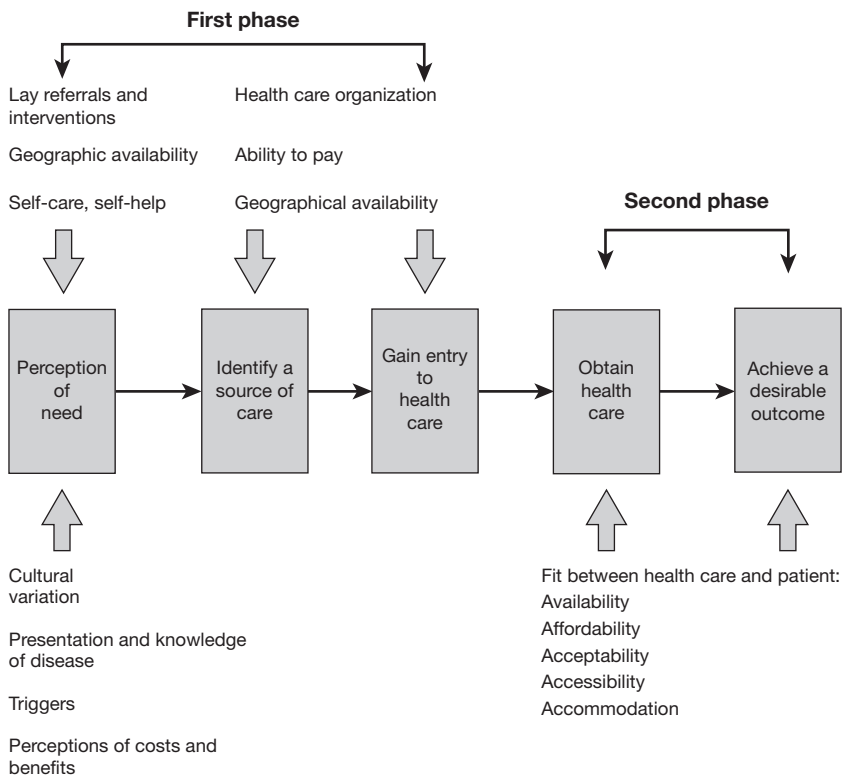


Figure 23.1 Factors influencing access.

This explanation is a simplified conceptual overview of access. Many researchers have tried to develop models and explanations of access that capture the complexity of the process (Andersen and Newman 1972; McKinlay 1972; Penchansky and Thomas 1981) (Table 23.1). Andersen and Newman (1972) is the most comprehensive and these authors suggest three major themes: predisposing factors to access (propensity to use services); enabling factors (aids and barriers to service use), and factors related to need.

The access model proposed by Penchansky and Thomas (1981) considered the problems of access as the ‘fit between the client and the health care system’. The equivalent in Andersen and Newman (1972) is organization of health care (see Table 23.1) The Penchansky and Thomas model is very useful to help plan and operationalize services to address access problems.

They use the term ‘access’ to describe the difficulties experienced with service use. Five aspects of health care use are addressed (see Box 23.2).

Availability of services

This refers to how well distributed health services are; for example, the ratio of dentists to the population in a

locality. It has been well described that doctors like to set up practices in middle-class areas where need for such services is small. Thus we have an abundance of practices in middle-class areas and a small number in more deprived areas where needs are greater—the *inverse care law*. Another consequence of the perception of the availability of services is the impact on the uptake of care. If it is perceived that services are limited, then demand for care becomes suppressed.

Accessibility of services

The accessibility of services has two dimensions. The first is about location: how far you have to travel to the nearest dental practice. For example, what is local

Box 23.2 Access problems

- Availability of services
- Accessibility of services
- Affordability of services
- Acceptability of services
- Accommodation of services

Penchansky and Thomas 1981.

Table 23.1 Equivalents in models of access

Andersen and Newman 1972	McKinlay 1972	Penchansky and Thomas 1981
Predisposing factors (Propensity to use)	Socio-demographic	
	Socio-psychological	
	Socio-cultural	
Enabling factors (Aids and barriers to use)	Economic factors	
	Geographic factors	
	Organization	Accessibility, availability, acceptability, accommodation, affordability =fit between services and client
Factors related to need		

Gibson, B. et al. 2001.

transport like if you are not a car owner? The second aspect is a spatial dimension: whether a person can physically access the premises. For example, an older person with arthritis would find climbing stairs to reach a dental surgery a significant barrier to visiting that practice.

Affordability of services

Having to pay for dental treatment can act as a barrier to people using dental services. Of course, in addition to the direct costs of dental treatment there are some indirect costs that people include in the equation about whether 'it is worth' having dental treatment. Examples of such indirect costs are: having to take time off work, having to pay travel costs, and having to pay for child-care while at the dentist. Some groups will suffer greater disadvantage, depending on how they are paid. Low-income workers are usually paid by the hour, and the cost to them of taking time off work is greater than to someone on a salary.

DISCUSSION POINTS 2

What things are worth paying for?

What services are of value to you, and how do you make that judgement?

Acceptability of services

Users and providers of health services have expectations about how services should look and be like. These expectations are not always shared. Dentists want to attract to their practice patients who pay on time, behave well in the waiting room, and enhance the image of the practice. Patients would like to be made to feel welcome in the practice and to feel information was easy to find, and they would like to be dealt with professionally but treated as an individual. The acceptability of the practice to the patients is important. A study of homeless people in London found that some homeless people would rather use the outreach dental service based in the homeless shelter, because they perceived that the dentists there would be more accepting of their appearance and circumstances. In

contrast, some younger homeless people wanted to use a 'proper high-street dentist' because only 'dossers' use the dental outreach service.

Accommodation

This refers to the way in which care is provided in terms of extended opening hours, emergency and drop-in clinics, late night clinics, waiting times, and ease of getting an appointment. Many people feel that a drop-in dental service would be ideal. The Penchansky and Thomas framework is very useful for identifying the structural problems in the organization of health care, but it ignores the social and behavioural science explanations of access.

DISCUSSION POINTS 3

Imagine you are on holiday alone, backpacking. You visit a country whose language you do not speak. You fall ill with a tummy bug. You need to see a doctor urgently.

What are your concerns about this?

What information will you need?

How and where will you get it?

How does all this make you feel?

Now return to your answers and apply the Penchansky and Thomas framework to explore the barriers you might face in this situation.

Access problems and dental care

In 1988, Finch examined the reasons why people did not use dental services regularly, and she used the term 'barriers to the receipt of dental care'. Her findings are reproduced in Box 23.3. The terms 'access to care' and 'barriers to care' are both used in the literature but essentially mean the same thing. When Finch *et al.* asked people how they thought barriers to dental care might be overcome, they said dentists should be friendlier, explain more, have an approachable manner, and help them manage their dental anxiety. They also suggested that dental practices should extend their opening hours, have open days and drop-in clinics, take dental services to their places of work via mobile surgeries, and locate practices closer to where people

Box 23.3 Barriers to the receipt of dental care**Two main barriers**

- Fear and cost of dental treatment.

Other barriers

- Reception and waiting room procedures.
- Loss of control.
- Personality of the dentist.
- Clinical smell.
- Hearing the sounds of dental treatment.
- White coats and bright lights.
- Feeling vulnerable in dental chair.
- Getting treated like you are a mouth.
- Travel time, time off work.

Finch *et al.* 1988.

lived. Patient expectations in developed countries have changed in the last 60 years. In the UK in the 1940s, replacement of the natural dentition with dentures was a normal occurrence for people in their forties. Now people expect to keep their natural dentition for life. Despite a heavily subsidized dental service in the UK, people cited fear and cost as the two most important barriers to seeking care (Finch *et al.* 1988). In 2009, 12% of people in a national survey in England and Wales were dentally phobic—indicating that fear of the dentist remains a significant barrier to accessing care (Chenery 2011). In the 2009 survey, 73% of adults reported that cost of care had not prevented them seeking dental care and 81% reported that cost of care had not delayed a decision to seek care (Chenery 2011). There remain, however, a proportion of people who continue to perceive costs as a barrier to dental care.

Appropriate service use and recall intervals

The appropriate use of health services is a complex issue. People may have very valid reasons for using services in a way that health professionals may not advise. The conflict over what is considered to be appropriate use of dental services draws us back to lay and health

professional communication problems. Because lay people have different expectations and different concepts of health, their use of health services will reflect these differences. Consider the issue of regular attendance at the dentist. In the UK the accepted advice over the years has been regular attendance every 6 months. But given the decline in decay rates amongst younger cohorts, this is no longer an appropriate recommendation. Many people had already started to increase the interval between visits (and were described as irregular attenders) before formalization of guidance on recall came from regulatory authorities.

DISCUSSION POINTS 4

What advice about regular attendance would you give to a healthy 23-year-old with a DMFT of 2 and good oral hygiene?

What advice about regular attendance would you give to a mother with two children under five, both of whom have decayed teeth?

What advice about regular attendance would you give to a 60-year-old man with a heavily restored dentition and evidence of pocketing and clinical attachment loss?

What were the reasons for your recommendations?

According to NICE (2004), it is recommended that all adult patients should receive an oral health assessment at a frequency of 24 months. Children should receive one no later than 3 years of age and at a frequency of 12 months (NICE 2004). Focused oral health reviews (FOHR) are recommended to take place between the recommended recall time intervals, depending on the risk assessment and the need to reassess patients once their initial condition has been managed (SDCEP 2011).

Approaches to improving access for underserved groups and populations

As described in Chapter 16, people with disabilities and vulnerable groups have difficulties in accessing dental services. Other important underserved populations are rural communities, which may also include indigenous

first nation communities. Most of these groups and populations have diverse problems that bring about disadvantage, but what many do have in common are problems accessing dental care. A first step is to minimize the experience of oral diseases and need for dental treatment through reducing the risk factors for oral disease and effective health promotion. Access issues are complex and a multi-faceted approach is needed to tackle access problems (Burt and Eklund 2005). Issues such as who pays for dental care are government-level policy issues; however, it is possible to make services more flexible, friendly, and accommodating to address some of the availability issues and psycho-social issues in relation to accessing dental care.

In rural communities and underserved areas, the main access problems may be related to a scarcity or the supply of dentists. In these cases it is possible to extend dental services by using the whole dental team, including dental therapists, dental hygienists, and expanded duty dental nurses. It is also possible to adopt new approaches to managing caries, such as the 'atraumatic restorative technique' (ART). In this technique, health care workers are trained to remove superficial caries in children (usually without the need for local anaesthesia) and place high viscosity glass-ionomer restorations (Frencken *et al.* 2012). ART is now a cornerstone of the Basic Oral Health Care Package, extending the reach of dental services for children and reducing inequalities in oral health care.

Dental services in rural areas and underserved areas might also be extended by the use of mobile dental surgeries. By using the whole dental team, mobile dental clinics, and techniques such as ART, it is possible to extend the reach of dental services and address problems with the 'availability' of dental services.

For other groups, there may be a need to take dental services to them, through domiciliary oral health care services (DOHC). DOHC is defined as a dental service that reaches out to care for those who cannot reach a service themselves (British Society for Disability and Oral Health (BSDH) 2009). DOHC includes oral health care and dental treatment undertaken in the environment where the patient is either temporarily or permanently resident, i.e. care is delivered in the patient's

own setting as opposed to a dental clinic or in a mobile dental surgery. Typical sites for DOHC would be residential and nursing care homes, hospitals, day centres, and patients' own homes. It is anticipated that the demand for DOHC will increase in the UK, because the population is aging, people are retaining their teeth for longer, and some older people may become medically compromised and functionally dependent. The BSDH (2009) has identified the following care groups as potentially in need of DOHC:

- people with physical disabilities with mobility problems;
- people with medical conditions such as chronic obstructive airway disease and emphysema;
- people with severe and profound learning disabilities;
- people with mental health problems such as Alzheimer's disease;
- people with dental anxiety and phobia;
- people in the following environments: hospitals, palliative care units, and hostels for homeless people.

Adherence and communication problems

Patient adherence is defined as 'the extent to which a person's behaviour—taking medication, following a diet, and/or executing lifestyle changes—corresponds with agreed recommendations from a health care provider' (Sabaté 2003). The concept is important because should patients not follow health care advice, it is possible their condition may not resolve or it may get worse, resulting in failed treatment and disability. The consequences of non-adherence with treatment and preventive regimes is a waste of scarce resources, denying others the opportunity to access care (Asimakopoulou and Daly 2009). The issue is a recognized problem throughout health care. For example, DiMatteo (2004) reviewed 50 years of adherence studies published in the USA up until the year 2000 and estimated that out of 760 million visits made to health care providers, about 200 million had concluded in

patients not following the advice. It is vitally important therefore that at every encounter with patients, time is taken to explain treatment and to give dental health advice in order to promote adherence. A small exploratory study recently explored patients' and dentists' recall of a dental consultation (Misra 2011). While dentists tended to have a superior recall of the consultation, patients seemed unable to recall accurately dental health advice or agreed future actions around dental health advice. Clearly, more work needs to be done in improving dentists' communication with patients. Chapter 10 explores how communication around behaviour change in patients may be supported in dental practice settings.

Conclusion

The primary purpose of health care is to relieve pain and suffering, restore and maintain physical, psychological, and social functioning, and improve the quality of life. Within the UK, greater accountability is now required from commissioners and providers of health care to achieve these aims. The problems with health care delivery can occur at both a micro and a macro level of operation and require a whole-system approach to their solution. One such whole-system approach is the Alma-Ata Declaration, as outlined in Chapter 1. The key features of this approach are worth stating again: equitable distribution of health care; a focus on prevention; use of appropriate technology; a multi-sectoral approach; and community participation.

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Useful websites

British Society for Disability and Oral Health: <http://www.bsdh.org.uk/index.php> and to access a range of guidelines for people with disabilities <http://www.bsdh.org.uk/guidelines.html>.

British Society of Gerodontology: to access guidelines on care of older people <http://www.gerodontology.com/guidelines.html>.

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