

Health Council of the Netherlands

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# Perspectives on oral health care

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To the Minister of Health, Welfare and Sport

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Subject : presentation of advisory report *Perspectives on oral health care*  
Your reference : -  
Our reference : U-7104/GS/db/863-B  
Enclosure(s) : 1  
Date : April 27, 2012

Dear Minister,

There is currently a great deal of public interest in oral healthcare services and oral health in general. In recent years, primary oral care has undergone major changes in relation to funding, the organisation of dental practices, the division of tasks between the various professional groups, and the services offered. The oral health status of vulnerable groups such as frail elderly and young children is a topic of frequent discussion. At the same time, public demand for transparency over quality of care has become more explicit. Patients want to know what quality of care they can expect and how it relates to the expenses.

In light of these developments, the Health Council of the Netherlands saw reason to investigate the scientific evidence base for oral care. Can this base be strengthened and would this in turn lead to better care? The council has appointed a Committee chaired by Prof. E. Schadé to prepare this advisory report. The report has been reviewed by the Advisory Committee on Health Research and the Standing Committee on Medicine. It is a pleasure to present the final result: *Perspectives on oral health care*. The relevance of this report is highlighted by the experiment with free market rates for primary oral care currently taking place in the Netherlands.

At the moment, quality policy in oral healthcare is primarily directed at the preconditions for care rather than at the care itself. The evidence base for clinical decision-making is often lacking and, in contrast to the situation in medicine, the use of evidence-based guidelines is rare. Guideline development could improve the quality and transparency of care in several ways, such as by reducing the amount of treatment variation between dentists. Guidelines are also a precondition for the safe delegation of tasks from one professional to another. The



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**Gezondheidsraad**

Health Council of the Netherlands



Subject : presentation of advisory report *Perspectives on oral health care*

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Committee recommends commencing the process of guideline development as soon as possible by formulating “best practices” for those areas of care that have the highest amount of treatment variation. In the meantime, scientific research that addresses the questions most relevant to daily practice can be set up.

A stronger connection between everyday practice and academia can strengthen the steps that have already been taken in developing quality policy for oral healthcare. I expect that this will provide oral healthcare professionals with an important instrument to address the public call for transparency. I therefore fully support to the Committee’s recommendations.

Yours sincerely,

(signed)

Professor H. Obertop

Acting President

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P.O.Box 16052

NL-2500 BB The Hague

Telephone +31 (70) 340 66 18

Telefax +31 (70) 340 75 23

E-mail: G.A.J.Soete@gr.nl

Visiting Address

Parnassusplein 5

NL-2511 VX The Hague

The Netherlands

[www.healthcouncil.nl](http://www.healthcouncil.nl)



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# Perspectives on oral health care

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to:

the Minister of Health, Welfare and Sport

No. 2012/04E, The Hague, April 27, 2012

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The Health Council of the Netherlands, established in 1902, is an independent scientific advisory body. Its remit is “to advise the government and Parliament on the current level of knowledge with respect to public health issues and health (services) research...” (Section 22, Health Act).

The Health Council receives most requests for advice from the Ministers of Health, Welfare & Sport, Infrastructure & the Environment, Social Affairs & Employment, Economic Affairs, Agriculture & Innovation, and Education, Culture & Science. The Council can publish advisory reports on its own initiative. It usually does this in order to ask attention for developments or trends that are thought to be relevant to government policy.

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## Executive summary

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Healthy teeth in a healthy mouth are of great importance to daily functioning and well-being. Primary oral care has undergone many changes in the past years, including changes in funding, practice organisation and care offerings. Society increasingly expects care providers to show accountability for the quality of care provided. Dentists also face this issue. There are signs that the quality of oral care is not always transparent, and that there is substantial practice variation between dentists. These signs were the reason for the Health Council to examine the evidence base of oral care in closer detail. To what extent can it be strengthened and would this lead to improved care? A specialised Committee has been appointed to answer these questions. The activities of this Committee are especially relevant given the current experiment with free market rates in oral care in the Netherlands.

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### **Available data are limited**

Although oral health in the Netherlands has improved significantly compared to 30 years ago, a significant proportion of the population still suffers from oral diseases. For example, while caries and periodontitis may be avoided using relatively simple preventive measures, both diseases remain common. The costs of oral care are equivalent to those of primary medical care, and are rising in step with overall care spending. Data on oral health in the Netherlands are limited. For example, there is no available information on regional differences that may

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exist. People with a low socioeconomic status, frail elderly people and individuals with underlying medical conditions are at increased risk of dental problems. The factors that contribute to this are insufficiently understood. Data on accessibility of oral care is also lacking for these groups. The increasing number of people who suffer from multiple medical conditions at the same time is a growing problem. To provide proper treatment for this group, doctors and dentists should be aware of how their respective treatments affect each other.

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### **Evidence-based practice is not self-evident**

In recent years, quality policy has received increased attention within the field of oral care. However, efforts at improvement have primarily focused on the preconditions for care delivery rather than the quality of the care itself. Whereas evidence-based practice is slowly becoming the norm in the medical world, this is not yet the case in dentistry. This is not only true for the Netherlands, but also internationally. There are few evidence-based guidelines describing the best treatment for specific conditions. Consensus on treatment decisions also appears to be lacking in daily practice, as demonstrated by a number of examples. There are significant differences between dentists when it comes to treating caries in primary teeth of young children. Furthermore, many dentists schedule check-ups according to a fixed schedule, rather than tailoring the interval to their patients' individual situations. Guidelines on whether wisdom teeth should or should not be extracted are not widely followed.

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### **Gap between science and daily practice**

Most scientific research in the field of oral care is about fundamental scientific questions, or focuses on the development of new techniques. Hardly any research into treatment efficiency has been conducted. This type of research is necessary to provide an evidence base for guidelines. Research in the field of social dentistry is also scarce. This type of research is required in order to answer questions about the oral health of various population groups and to provide insight into effective prevention strategies.

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### **Recommendations**

In order to provide accountability for the quality of care provided (a wish shared by many patients) the evidence base of oral care must be strengthened. The Committee sees a number of means to this end.

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## Determination of treatment goals

Firstly, it is important that professional groups define what they perceive to be optimal care. To do this they must weigh the importance of various aspects of care, such as safety, patient satisfaction, treatment efficacy and cost-effectiveness.

## Guideline development

The Committee recommends evidence-based guidelines be developed that describe the best proven treatment for a specific condition. These guidelines can function as a vehicle for available knowledge to reach practitioners and may reduce unfounded variation in treatment decisions between dentists. They may also provide insight into the effects of oral care on the oral health of the population.

Oral care professionals (such as dentists, dental hygienists and dental prosthetists) have a crucial role in guideline development and implementation. To begin with, they must become convinced of the importance of using guidelines. As dentists are scientifically trained, they should play a leading role in initiating the development of evidence-based guidelines.

The Committee recommends starting by drafting best-practice recommendations for areas with the greatest treatment variation in the short-term. In order for guideline development to become truly evidence-based and to select other areas of interest, further research will be required.

## Data collection

It is of great importance to obtain greater knowledge of oral health in the Netherlands. To this end, the Committee recommends setting up a national monitor. This monitor should collect information about regional differences in oral health, oral health in vulnerable groups, the knowledge of the population concerning the prevention of oral disease, and the relationship between financial resources and access to oral care.

## Obtaining knowledge

To stimulate the interaction between science and daily practice, the Committee recommends creating a network of dental practices anchored to academic institutions. These are practices where scientific research is conducted and

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educational training is given. This research should address the questions that arise in daily practice and provide knowledge that can be used for guideline development. In the opinion of the Committee, professionals ideally should be able to follow a variety of career paths, with the possibility of combining private practice with academic work.

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# Introduction

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Oral health and the oral healthcare services have attracted a great deal of public interest in recent years. Despite the general impression that the oral health of the Dutch population is good, questions have been raised in various media about the oral health of certain groups, such as frail elderly people and young children. The possible relationship between oral health and other aspects of general health is receiving more and more attention.

In recent years, primary oral care has undergone major changes in relation to funding, the organisation of dental practices, the training and responsibilities of the various professional groups and availability of care. At the same time public demand for transparency over quality of care has become more explicit. This poses a challenge for care providers, as there are signs that clinical practice does not always have a clear evidence base and that evidence-based guidelines are rarely followed. There also appears to be a substantial degree of treatment variation.

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## 1.1 Questions put to the Committee

In response to this situation, the President of the Health Council has appointed a Committee of experts in the field of oral health and oral care (Annex A). This Committee has undertaken a broad analysis, which encompasses a number of issues: a general impression of oral health in the Netherlands; an analysis of

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clinical practice within oral care, focusing on the evidence base for clinical decision making; and an overview of the existing knowledge infrastructure. In conjunction with this analysis the Committee has answered the following questions:

- 1 To what extent can the use of scientific knowledge, and especially evidence-based guidelines, improve the quality of oral care and oral health among the population?
- 2 What can be done to promote the development and implementation of evidence-based guidelines?
- 3 In light of the answers to question 1, what are the priorities as far as knowledge infrastructure and research are concerned?

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## **1.2 Structure of the advisory report**

The report is divided into several descriptive chapters and a chapter containing recommendations. In the first three chapters the Committee analyses the different aspects of the problem. Based on its principal conclusions, it then answers the questions and makes recommendations.

The first part of the analysis provides a broad overview of the context of the advisory report, i.e. oral health. How important is it to have a healthy mouth and what are the contributory factors? The report then describes the current state of oral health in the Netherlands and considers the oral diseases that afflict people of different ages, as well as groups that are at risk.

The second part of the analysis examines the quality of primary oral care. The perceived variation in treatment within oral care is explored. Is there, in fact, variation between different care providers and, if so, what is the nature of that variation? A key question here is the extent to which variation is due to a lack of knowledge, or failure to use what knowledge is available. In order to provide a complete overview of the problem, the report also discusses patient-related contributory factors.

The third part of the analysis examines the knowledge infrastructure concerning oral health and oral care, looking not only at the generation of scientific evidence but also at the structures for knowledge transfer to daily practice. What are the weak links in the chain?

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Based on this overview of the problem, in the final Chapter the Committee makes recommendations regarding the ways in which the application of knowledge can improve oral health and the quality of care.



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## Oral health in the Netherlands

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What are the most common oral diseases and what is known about factors that contribute to them? Why is oral health important? And what is the general status of oral health in the Netherlands? What favourable and unfavourable trends are there, and which groups are most at risk? This chapter outlines the broader social context of this advisory report, focusing on large groups of people and on the most common oral diseases.

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### 2.1 What is oral health?

How does one define oral health? Classical definitions of health are based on disease (or its absence) and death. However, the definition used by the World Health Organization (WHO) is much broader: *A state of complete physical, mental and social well-being*. In accordance with this definition, recent decades have seen an increasing focus on the impact of illness (and chronic illness in particular) on quality of life. In 2010 an international conference jointly organised by the Netherlands Organisation for Health Research and Development (ZonMw) and the Health Council reformulated the WHO definition. Health must be regarded as a dynamic concept that is defined at three levels: the clinical, pathophysiological state of the body, the individual's ability to function (both physically and psychologically), and social and societal participation. The same rationale can be applied to oral health. Thus, oral health is to be considered in terms of: the clinical, pathophysiological status and

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functioning of the mouth and surrounding tissues; the individual's ability to function; and social and societal participation.

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### *2.1.1 Oral healthcare services*

The oral healthcare services provided (see Chapter 3) by dentists and dental hygienists are aimed at preventing oral diseases in first instance. If primary prevention fails, only modification of behaviour and lifestyle can help to actually halt disease processes. If disease has resulted in major damage, action may be needed to repair that damage and/or restore function. The materials used for damage repair do not usually last for the patient's lifetime, and less and less of the original tooth remains after each restoration. The dentist must possess both medical knowledge about the course of disease processes and technical knowledge that is needed in order to design restorations and constructions and evaluate their failure, taking into account the so-called re-restoration cycle.

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### *2.1.2 Disorders of the mouth*

There are many different disorders that manifest in or near the oral cavity. In the public mind, however, oral health is often confined to caries and periodontitis. This is understandable in view of the very high prevalence of these diseases (and their consequences). As the emphasis in the questions put to the Committee is on primary oral healthcare, we have chosen to focus this discussion of oral diseases mainly on common conditions that are relevant to primary care because they are diagnosed and/or treated at that level. The Committee wishes to emphasise that the context of oral health extends beyond the prevention, diagnosis and treatment of caries and periodontitis. Box 1 gives a brief overview of five categories of oral problems, which are discussed later in the report (some in more detail than others).

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## **Box 1: Disorders of the mouth**

### Microbial diseases

Caries and periodontitis are both diseases mediated by bacteria that accumulate on the teeth (dental plaque). However, these two diseases have different causes, and they also follow different courses. In the case of caries, the metabolisation of dietary sugars by certain types of bacteria gives rise to acids, which initially attack the tooth enamel and then the underlying tissue, leading to cavities. Saliva acts as a buffer against this demineralisation process. Almost the entire adult population has some form of caries experience (a measure of the extent of cavity formation, regardless of whether the tooth is subsequently filled or extracted), but in most people the disease progresses slowly. Periodontitis is an inflammation (frequently chronic) of the tissues surrounding the teeth (the periodontium). This inflammatory reaction results in destruction of the periodontium and jaw bone. If left untreated, periodontitis can lead to loosening and, ultimately, loss of teeth. A less serious form of inflammation is gingivitis (inflammation of the gums).

### Tooth wear

Tooth wear is divided into three different forms. Attrition is the physiological wearing down of the teeth over many years through biting and chewing and is a normal part of aging. Abrasion is the non-physiological, mechanical wearing down of the teeth. Common examples of abrasion are the wearing down of the molars by grinding (bruxism), wear due to piercings, and wear caused by incorrect tooth-brushing. Erosion is chemical wear that occurs through frequent exposure to acids in the diet or as a result of frequent vomiting (e.g. in bulimia patients). Abrasion and erosion can result in serious damage to teeth, even at a young age. Erosive tooth wear is becoming increasingly common in young people (see 2.3).

### Functional disorders

Functional disorders of the mouth – such as an impaired ability to chew, pain in the temporomandibular joint, and problems with eating and drinking

– can have various causes. Among the most important of these is tooth damage or loss due to caries, periodontitis or tooth wear. Orthodontic abnormalities can also give rise to functional problems, as can abnormal oral habits. Temporomandibular disorders give rise to pain in the temporomandibular joint and/or the masticatory muscles and limit opening and closing of the mouth.

### Aesthetic abnormalities

The teeth play an important role in social interaction as they determine the appearance of the face. In Western society, it is fairly standard practice to treat aesthetic imperfections. In dentistry, a great deal of attention is focused on maintaining the natural appearance of the teeth. Restorations are performed in tooth-coloured filling materials and discoloration of teeth is corrected. Aesthetic factors are also taken into consideration when treating orthodontic abnormalities, in addition to functional and oral-hygiene considerations. The Committee considers it relevant to make the distinction between cosmetic treatments that are aimed at bringing the aesthetics of the teeth within the generally accepted social norm and those that aim to achieve a particular aesthetic ideal. An example of the latter is the bleaching of teeth so that they become whiter than the original colour. It should be noted that the boundary between these two categories is prone to shift over time.

### Cancer

Cancer of the lips, oral cavity or pharynx mainly occurs in middle age and later. The tumours are virtually all squamous-cell carcinomas and arise from the mucosa that coats the various parts of the mouth and pharynx. The principal risk factors are smoking, use of chewing tobacco and excessive alcohol use. Other risk factors for lip cancer are exposure to sunlight and pipe-smoking and, for throat cancer, exposure to the human papilloma virus (HPV). Five-year survival depends greatly on the location of the carcinoma and the stage at which diagnosis takes place.

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### 2.1.3 *Determinants of oral health*

Most disorders of the mouth have a multifactorial cause. In this respect, oral diseases can be compared to chronic lifestyle diseases such as diabetes, cardiovascular disease and obesity. Due to the complex interaction between different risk factors at different levels there is marked individual variation in the progression of oral diseases: not everyone who is exposed to adverse conditions develops these diseases to the same extent; nor is everyone who takes preventive measures protected to a similar degree. A recently published report from the Royal Netherlands Academy of Arts and Sciences (KNAW) identifies three tiers of contributory factors for multifactorial diseases: genetic factors, environmental factors, and lifestyle related factors.<sup>1</sup> These determinants may overlap. As far as oral health is concerned, the situation is as follows.

- The microclimate in the mouth is partly determined by genetic factors, such as the composition of the tooth enamel and saliva. To a certain extent this influences the progression of diseases such as caries and periodontitis. Hereditary characteristics also have an indirect influence on the progression of oral diseases: for example, they can influence a preference for sweet foods. Given the high prevalence of caries, however, it should be noted that the potentially protective effect of genetic factors is limited. The alignment of the jaw and teeth is largely genetically determined.
- Environmental factors influence oral health at several levels. The bacterial composition of the dental plaque has a major influence on the microclimate of the mouth. At the individual level, variables such as age and general state of health play a role. Social and societal determinants are access to professional oral care, the insurability of this care, the prevailing social norms concerning oral health and the availability of fluoride (e.g. via toothpaste, as is the case in the Netherlands).
- There are a number of lifestyle-related determinants that influence oral health. Eating patterns are partly instrumental in determining oral health, insofar as they influence caries activity and the degree of erosive wear. Maintenance of good oral hygiene is essential for good oral health. Use of tobacco and excessive use of alcohol are risk factors for oral disease. Medication can affect the flow of saliva and thus influence oral health.

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#### 2.1.4 *Prevention of oral disease*

An important hallmark of the most common oral diseases is the fact that they can, to a large extent, be avoided by taking preventive measures. There is conclusive scientific evidence showing that simple measures undertaken as part of daily self-care are, in most cases, effective safeguards against the onset and progression of caries and periodontitis.<sup>2</sup> It is therefore interesting that the prevention of these diseases is still not entirely effective in a large proportion of the population (see Section 2.3 for data). This may be due to a lack of knowledge about effective prevention or to the fact that preventive behaviour is not adopted as a matter of course. Given the lack of data concerning the level of knowledge in the population at large, it is unclear whether or not basic preventive measures against oral diseases are common knowledge. In any case, obtaining knowledge is only one aspect of the complex process of learning or unlearning behaviours, whether the emphasis is on oral health or other aspects of health. Information about recommended measures may indeed lead to a higher level of knowledge, but it is not usually sufficient to ensure that people do actually adopt certain behaviours. Although there is a scientific consensus over the preventive measures that are effective against oral diseases, effective ways to impart preventive behaviour are still a matter for discussion.<sup>3,4</sup> There is no scientific evidence of the long-term effectiveness of patient education initiatives alone in supporting changes in oral health behaviour.<sup>5,6</sup> Nevertheless, provision of information is still the principal method for promoting preventive behaviour, both at the individual and the collective level.

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## 2.2 **The social importance of oral health**

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### 2.2.1 *The impact of oral health on well-being and quality of life*

Most oral diseases are not directly life-threatening (exceptions being oral and laryngeal cancer). Disorders of the mouth do, however, have a major impact on physical and mental well-being and on social functioning, insofar as they affect a person's ability to eat and to talk, as well as their physical appearance. Thus physical, psychological and social limitations resulting from oral diseases can be comparable to those associated with conditions that have a far more serious clinical outcome. The realisation that the health effects of a disease are not confined to its physiological symptoms is not new. Patients' self-reported symptoms and their perception of their own health often correlate poorly with the

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measured physiological effects of diseases. The same principles apply to oral diseases<sup>7</sup>: for example, levels of caries experience do not correspond to a person's perception of their own oral health. There is, however, a strong association between edentulousness and poor subjective oral health,<sup>8,9</sup> whereas edentulous people frequently have no remaining clinical symptoms of oral disease. Therefore, the description of oral health should not be limited to the presence or absence of physiological signs of oral disease. The effects of oral diseases on well-being and quality of life are important elements of individual disease burden<sup>7,9</sup> that often persist throughout the patient's lifetime, especially in the case of missing teeth.

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### 2.2.2 *The association between oral health and general health*

Although the mouth is frequently considered separately from the body when considering health and healthcare, it is, of course, an integral part of it. It is therefore not surprising that health problems such as malnutrition, infections, stress and chronic disease lead to clinical symptoms in the mouth, and that medicines taken for chronic diseases can affect oral health (see Box 2). Conversely, disorders of the mouth and dental treatments can also affect the rest of the body. Alongside the direct consequences of oral diseases, there are also less obvious interactions between oral and general health, which are receiving considerable attention at present. In particular, there is a growing body of scientific literature investigating the role of periodontitis as an independent risk factor for cardiovascular disease.<sup>11</sup> The association between oral hygiene and cardiovascular disease has recently also been explored in a cohort study.<sup>10</sup> The role of periodontitis during pregnancy as a risk factor for complications such as premature birth, low birth weight and pre-eclampsia is a further topic about which more and more research findings are being published.<sup>12-14</sup> As the results of the various studies on this subject are extremely heterogeneous, they need to be interpreted carefully as far as the situation in the Netherlands is concerned.

### **Box 2: Medical-dental interactions**

Many medicines and treatments for chronic conditions have side effects, such as a reduction in the flow of saliva (xerostomia).<sup>15</sup> Aside from the discomfort that it causes, xerostomia also has major implications for the progression of caries and periodontitis. The number of antimicrobial proteins naturally present in the oral cavity is also reduced, which can give rise to mucosal infections. This is a growing problem, since a large proportion of the population (especially the elderly) take one or more medicines in connection with chronic conditions. To raise awareness of this problem among the medical profession it is important that the oral side effects of a wide range of medicines are reviewed in the curricula of training programmes.

Medical treatments can influence oral health. Conversely, some dental treatments can have repercussions on general health. Antibiotics and painkillers prescribed in dental practice may interact with medication that is taken in connection with other conditions.<sup>16</sup> Some dental treatments are inadvisable for people who are taking particular medication (e.g. anticoagulant therapy) or have certain underlying conditions. In some cases the use of restorative materials can lead to toxic and allergic reactions.<sup>17</sup> It is debatable how widely accepted the notion is among dentists that they should ask patients about use of medication or underlying conditions and allergies. It is also unclear whether doctors have sufficient knowledge to establish the relationship between dental treatments and symptoms elsewhere in the body.

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#### *2.2.3 The costs of primary oral care*

The costs of oral care are an important aspect of the social relevance of oral health. The fact that oral care for adults is privately funded in the Netherlands does not make the cost aspect any less relevant to the public. The costs of care provided in dental practices are comparable to the costs of care provided in general medical practices. Figure 1 shows these costs during the period 1998-2010 as a percentage of total healthcare costs, as calculated by Statistics Netherlands (CBS) in December 2011.<sup>18</sup> The amount spent on dental care in 2010 was upwards of € 2.6 billion. This represents 3.0% of total healthcare

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expenditure, which stood at € 87.1 billion. The cost of primary medical care in 2010 was € 2.5 billion, 2.9% of total healthcare expenditure. The cost of the care provided in dental practices in 2010 increased 3.3% compared with 2009, while total healthcare expenditure rose by 3.6%. The cost of dental care rose just as rapidly as total healthcare expenditure over the period 1998-2010. According to an estimate from the Health Care Insurance Board (CVZ), the total cost of primary oral care stood at € 3.1 billion in 2010 (3.6% of total healthcare expenditure). In addition to the cost of the care provided in dental practices, this estimate also includes the cost of the care provided by self-employed dental hygienists and expenditure on complete dentures.

Some of the expenditure on oral care is publicly funded. For example, the latest data from the CVZ show that around € 586 million was spent on oral care in 2008 under the Dutch Health Insurance Act.<sup>19</sup> The greater part of this sum (€ 316 million) was spent on young people up to the age of 22 years.

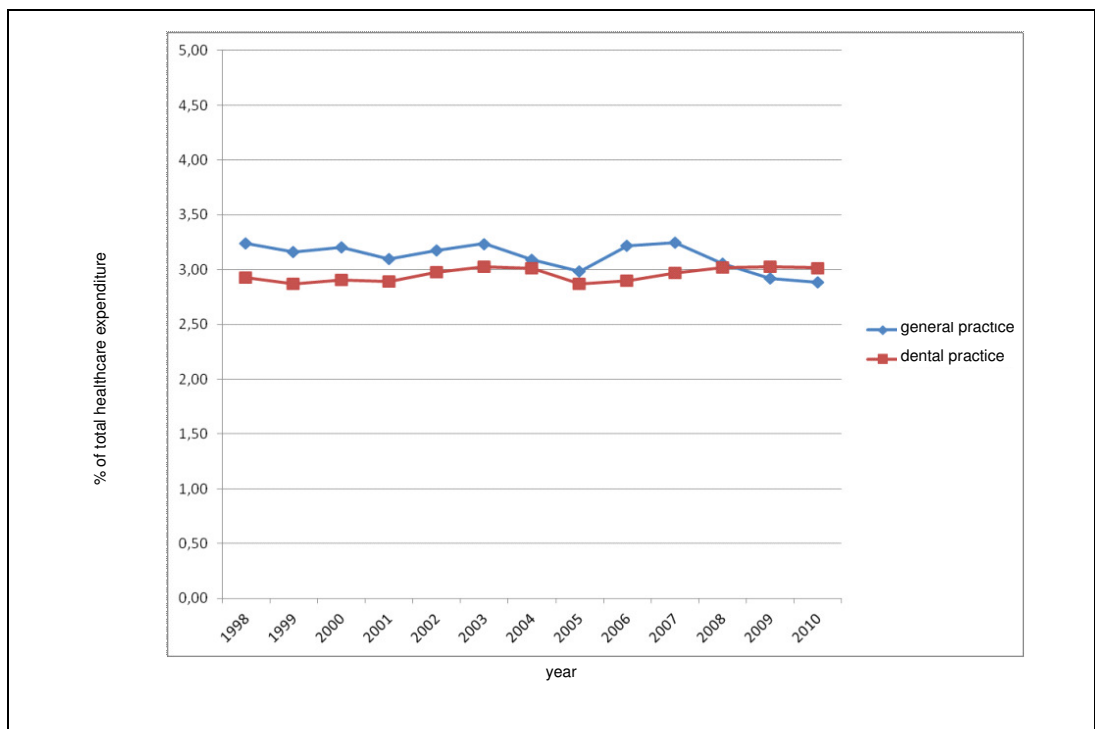


Figure 1 Costs of care provided in general medical practices and dental practices as a percentage of total healthcare expenditure.

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## 2.3 The epidemiology of oral health in the Netherlands

In describing the oral health of the Dutch population, this report differentiates between several age groups: children (up to 18 years), adults (18-55 years), and the elderly (55+). In the interests of readability, the main report confines itself to the principal conclusions for each group. More detailed data can be found in Annex C.

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### 2.3.1 *Oral health in children*

Tooth damage cannot be reversed, and damage suffered in childhood has irreversible consequences for oral health throughout life. In children, the most significant aspect of oral health is therefore the prevention of damage to deciduous teeth and permanent teeth. The principal cause of tooth damage among children is still caries. In addition, exposure to acids in the diet can cause erosive tooth wear, which also occurs widely in young people. The correction of orthodontic abnormalities as soon as the permanent teeth have erupted is undertaken both for functional as well as aesthetic reasons.

#### Summary of key epidemiological trends among children in the Netherlands

The reduction in caries experience among young people appears to have halted, since no major changes have been observed in the past ten years.<sup>20</sup> The prevalence of caries remains high, however, with more than half of 5-year-olds having cavities in deciduous teeth and over 80% of young adults having no further sound teeth by the time they reach 21 years of age. In all age groups, children with low socioeconomic status have more caries experience than children with high socioeconomic status. The number of young people with erosive tooth wear has risen sharply in the past ten years: around one in three 21-year-olds had serious signs of wear in 2009.<sup>20</sup> The causes and the course of erosive tooth wear are complex and subject to several variables (some of them being dietary).<sup>21,22</sup> The number of children that undergo orthodontic treatment has likewise risen sharply in recent decades, from around one in five at the end of the 1980s to more than half in 2009.<sup>20</sup> See Annex C for further epidemiological details.

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### 2.3.2 *Oral health in adults*

As is the case for children, the prevention and postponement of the caries process and the repair of damage due to caries are important aspects of good oral health for the current generation of adults. The introduction of toothpaste containing fluoride in the 1970s was a milestone in the prevention of caries in the Netherlands. It is likely that the generations that have grown up “post fluoride” will experience problems from cumulative caries damage at a later age than previous generations. In adults, accumulated wear to the teeth and surrounding tissues increases with advancing age. This manifests itself in discolorations and abrasion of the teeth and in exposed and eroded dental roots. Periodontal problems and temporomandibular joint disorders occur frequently in adults. It is difficult to make an exact estimate of the prevalence of periodontitis, since epidemiological measurement techniques are less easily reproducible for periodontitis than for caries. The WHO estimates that serious (i.e. progressive) forms of periodontitis with bone destruction occur in 10-15% of the adult population.<sup>23</sup> A far greater proportion of the population has mildly inflamed gingivae (gingivitis).

#### Summary of key epidemiological trends among adults in the Netherlands

Adult oral health has improved over the past thirty years. Caries experience has declined markedly and people are keeping their natural teeth for longer.<sup>24,25</sup> There is, however, considerable socioeconomic inequality as far as oral health is concerned.<sup>25</sup> There may be an association between oral health, whether or not a person has supplementary insurance for oral care, and/or ability to pay for care. See Annex C for further epidemiological details.

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### 2.3.3 *Oral health in the over 55s*

The wearing down of the teeth and the aging of the tissues in the oral cavity have an impact on oral health in older adults. However, loss of teeth is not a natural consequence of aging but a consequence of accumulated damage. The current generation of older adults mainly have to contend with major cumulative damage caused by caries.<sup>25</sup> The teeth have usually undergone extensive restoration using techniques that result in fairly substantial tissue loss. Furthermore, these restorations will have been replaced fairly regularly, resulting in the progressive loss of more and more of the original tooth (the re-restoration cycle)<sup>26</sup> and

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frequently culminating in the loss of the natural tooth. The current generation of older adults have lost a substantial number of teeth.<sup>25</sup> Nowadays, there are extensive techniques for prevention and repair of damage. Although it is impossible to accurately predict the oral health of future generations of elderly people, the general expectation is that they will retain their natural teeth for longer than the current generation of elderly people.

A strong association exists between the number of teeth and self-reported oral health.<sup>8</sup> In particular, complete edentulousness has far-reaching effects on diet and quality of life. Either prostheses or implants (or a combination of the two) are used in order to restore functionality following loss of teeth. Many elderly people still have complete dentures<sup>24</sup>, which have certain disadvantages. Prostheses are less efficient than natural teeth. Furthermore, complete dentures eventually loosen due to resorption of the alveolar ridges. Implants that replace teeth and prostheses that are secured with implants restore function more effectively and have aesthetic benefits. Implants require careful maintenance, however, and can lead to complications.

### Summary of key epidemiological trends among elderly people in the Netherlands

No specific epidemiological research into the oral health of elderly people has been conducted so far, and consequently few details are available about this group. The most significant trend is that older people are keeping their natural teeth for longer and longer.<sup>24,25</sup> See Annex C for detailed epidemiological data.

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#### 2.3.4 *Groups at risk*

A number of population groups are at increased risk of developing oral health problems. Groups at risk are people with low socioeconomic status, children, frail elderly people, and people with underlying medical conditions.

##### People with low socioeconomic status

Generally speaking, the health of people with low socioeconomic status (SES) is poorer than that of people with high SES. Oral health is no exception, with less educated individuals generally having poorer oral health and being less satisfied with their oral health than better educated people.<sup>25</sup> This correlation also applies at an international level. Among children too, SES is a key risk indicator for

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caries.<sup>20</sup> In children a number of contributory factors have been investigated which could partly explain the differences in caries experience. Most important of these are dietary variables and oral hygiene. Not all SES related differences can be explained by these variables, however.

## Children

Children are especially susceptible to tooth damage because the enamel of both deciduous teeth and newly erupted permanent teeth has a different structure from that of adult teeth. Furthermore, young children are not yet capable of self-care. The prevalence of caries among adolescents remains high, despite the introduction of fluoride as a preventive measure, and the prevalence of erosive tooth wear has increased sharply in the past decade.

## Frail elderly people

The proportion of elderly people is growing due to the “greying” of the population and increasing life expectancy. Around 15% of the population is currently over 65 and this percentage will grow to 20% by 2025 and 25% by 2040, when the greying phenomenon will peak. Around a quarter of the over 65s can be described as frail.<sup>27</sup> The Social and Cultural Planning Office (SCP) defines frailty in elderly people as the accumulation of physical, psychological and/or social functional deficits, which increases the likelihood of negative health outcomes. Frail elderly people have an increased risk of oral health problems.<sup>28</sup> Some of these problems are directly related to general health. Natural teeth require careful daily maintenance, which becomes more difficult as motor function declines. The natural chemical balance in the mouth changes with age due to decreasing saliva production and this process is often exacerbated by medication for chronic conditions (see Box 2). When mobility decreases, visiting the dentist becomes more difficult. This applies both to elderly people living at home and to those in care homes.

## People with underlying medical conditions

People with certain chronic conditions are at greater risk of oral health problems, and conversely, they are more likely to develop certain complications if they have poorer oral health. Diabetics are at greater risk of developing periodontitis.<sup>29,30</sup> The occurrence of periodontitis in diabetics has, in turn, been linked to fluctuations of blood sugar levels.<sup>30-33</sup> There is some evidence to

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suggest that periodontal treatment may influence glycaemic control, although its effectiveness is not yet entirely clear.<sup>34,35</sup> Likewise, gingival inflammation is a risk factor for the development of complications in patients with a compromised immune system. This includes cancer patients, transplant patients and patients with an immune disorder,<sup>36</sup> such as rheumatoid arthritis.<sup>37,38</sup> Furthermore, the medication for these conditions itself causes oral health problems (see Box 2).<sup>15</sup> Patients with chronic infectious diseases such as hepatitis B, tuberculosis and HIV/AIDS have specific oral health needs.<sup>36</sup> People with a physical or mental disability also have specific needs with regard to oral care, as do people with psychiatric problems.

In order to treat the increasing number of people with comorbidity it is extremely important that there should be a good circulation of knowledge between the various medical professional groups. With this in mind, the Council of European Dentists has called for a more integrated approach to chronic diseases, based on sharing of information and cooperation between the different healthcare professionals involved in primary care.<sup>39</sup> The Dutch Society for the Promotion of Dentistry (NMT) and the Association of General Practitioners (LHV) have likewise advocated more cooperation in primary care. However, referral relationships between dentists and general practitioners are more the exception than the rule (see Chapter 3), even though there are clear overlaps in the early diagnosis of lifestyle-related chronic diseases. As of yet, there are no guidelines for the dental treatment of patients with several comorbidities. The new six-year curriculum for dentistry is intended to expand the students' general medical background, and thus provide dentists with the skills to treat this growing group of patients.

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## 2.4 Conclusions

Good oral health is an important determinant of individual and social functioning and well-being, which should remain on the public health agenda. Oral health in the Netherlands has improved greatly since the 1980s. However, a large proportion of the population still suffers from the consequences of oral diseases and the costs of oral care are rising just as rapidly as total healthcare expenditure. A strong association still exists between oral health and socioeconomic status. A number of trends that have emerged in recent decades merit the attention of policymakers and professional groups:

- The prevalence of caries in young people remains high: half of 5-year-olds have some level of caries experience and only 15% of 21-year-olds have
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completely sound teeth. There is still room for improvement of preventive measures aimed at children and their parents.

- The prevalence of erosive tooth wear among young people has increased. This can have major implications for the lifespan of the teeth. Although the causes of this phenomenon have been investigated, it is not yet known what preventive measures are effective.
- The number of children that undergo orthodontic treatment has more than doubled in recent decades. In view of the high numbers, it would be useful to gather data concerning the aesthetic or functional need for these treatments.
- The need for oral healthcare among frail elderly people and people with underlying medical conditions has increased sharply. These groups have specific oral health problems and specific needs regarding care. According to the Committee, it is important that there should be sufficient mutual awareness of medical-dental interactions among medical and dental professionals and that consideration should be given to the accessibility of the care provided, especially for frail elderly people.

### Key knowledge gaps

Epidemiological data are currently collected in a limited number of locations. Consequently, it is not possible to draw conclusions about regional differences in oral health. Due to demographic differences it is conceivable that there may be differences between regions, for example between big cities and rural areas. In light of developments such as the experiment with free market rates as of January 2012, it is particularly relevant to determine whether there is an association between oral health and regional differences in the availability and cost of oral care, and whether the costs of this care can be a barrier to access. There is currently relatively little data about the factors that influence the oral health of vulnerable groups, especially frail elderly people and people with low SES. Nor is there much information about the accessibility of care for these groups. Analysis of the available data indicates that attention to oral health is primarily focused on caries. Other conditions, notably periodontitis, have received less attention at epidemiological level. Consequently, it is more difficult to draw conclusions about the extent of the disease burden in different groups.

Although the efficacy of a number of simple preventive measures against common oral diseases is undisputed, these diseases continue to occur in a significant proportion of the population. There are various explanations for this phenomenon. It is possible that people may not be sufficiently well informed

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about prevention of oral diseases. Or else people are informed, but for a variety of reasons they find it difficult to adopt preventive behaviour. Little is known about the level of public knowledge concerning prevention of oral diseases and the specific factors that determine whether or not preventive measures are adopted. Nor is much known about the effectiveness of interventions aimed at teaching preventive behaviour. Finally, we still have no definite answer to the question as to whether interventions aimed at preventing oral diseases should target groups at risk or the entire population in order to achieve maximum effect.

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## Primary oral care

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In this Chapter, the association between the quality of primary oral care and variation in treatment between dentists is discussed. The Committee has investigated what instruments are available for promoting and ensuring quality, and to what extent clinical practice is evidence-based.

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### 3.1 An overview of primary oral care

By way of background information a brief overview of the context is provided, i.e. the professionals and practice organisation involved in primary oral care.

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#### 3.1.1 *The professionals*

##### Dentists

Dentists are university-trained oral healthcare professionals who are qualified to provide individual patients with broad-based care, i.e. diagnosis, assessment, treatment planning, and treatment. The title of dentist is protected under the Individual Health Care Professions Act (the *BIG* Act) and is one of the eight professions classified in the “heavy” section. Having completed his or her training, a dentist is entitled to practise as a general practitioner. As of December 2011, 12,865 dentists were listed in the *BIG* register.<sup>40</sup> According to an estimate by the Dutch Society for the Promotion of Dentistry (NMT), around 8,700

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dentists were available to practise their profession in the Netherlands in January 2012 (i.e. under 64 years of age, with a Dutch residential or business address).<sup>41</sup> The first period of mandatory periodic registration for the *BIG* register for a number of medical professional groups, including dentists, began in 2012. The first mandatory re-registrations will take place in 2017. At the time of writing, no official information concerning the precise requirements has been made available.

### Dental sub-specialties

There are nine dental sub-specialties, each of which has its own learned society and maintains its own register. Sub-specialties (e.g. dentist/implantologist or dentist/periodontist) are not legally recognised, nor are they recorded in the *BIG* register. Around 800 dentists have a registered sub-specialty.<sup>41</sup>

### Dental specialists

There are two legally recognised specialisms in dentistry that require additional training: orthodontics and maxillofacial surgery. In order to use the title of orthodontist or maxillofacial surgeon, practitioners must fulfil the requirements for entry in the specialist register maintained by the NMT. According to an NMT estimate, 318 orthodontists and 216 maxillofacial surgeons were available to practise their profession in the Netherlands in January 2011.

### Dental hygienists

Dental hygienists are professionals who specialise in the prevention of oral diseases, notably caries and gingival problems. The work of the dental hygienist includes screening for abnormalities, making a diagnosis and drawing up a treatment plan within his/her own field of expertise. In addition, qualified dental hygienists may perform a number of specific procedures on behalf of the dentist, such as the restoration of primary caries. The title of dental hygienist is also protected under the *BIG* Act, but this is not classified as a 'heavy profession'. This means that dental hygienists are not listed in the *BIG* register. According to an estimate provided by the Netherlands Institute for Health Services Research (NIVEL), in cooperation with the Dutch Association of Dental Hygienists (NVM), 2,425 dental hygienists were available to practise their profession in the Netherlands in 2010.<sup>42</sup>

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The curricula for dentists and dental hygienists have recently been reformed.<sup>43,44</sup> Key objectives of the changes are that dentists adopt a more medically oriented approach to their work and focus their attention on more complex treatments, while dental hygienists receive broader-based training that enables them to perform all preventive procedures as well as a number of curative procedures. The goal of this policy is a reallocation of tasks from the dentist to the dental hygienist.

## Denturists

Denturists (also known as dental prosthetists and prosthodontists) specialise in taking measurements for and manufacturing dental prostheses. This professional title is protected under Section 34 of the *BIG* Act, and denturists are not listed in the *BIG* register. The Dutch Denturist Federation (ONT) estimates that 350 denturists are currently working in the Netherlands.<sup>45</sup>

## Dental assistants

Nearly all dental practices employ dental assistants, who manage the instruments, perform administrative tasks and assist in the delivery of care at the chairside. Preventive dentistry assistants are dental assistants who have completed a course that qualifies them to perform preventive care procedures on behalf and under the supervision of a dentist. There are a large number of dental assistants working in dental practices, some of whom have received formal training while others have not. According to an NMT estimate, they numbered 18,350 in 2010.<sup>46</sup>

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### 3.1.2 *Practice organisation within oral care*

A large proportion of oral care services are provided in dental practices. The number of general and specialist dental practices in the Netherlands was estimated at around 5,600 in 2010.<sup>46</sup> Furthermore, there are 21 dental clinics, which provide regular dental care to children and adolescents specifically, and 22 specialist dental clinics where care is provided to patients with serious dental, physical or mental health problems. In 2010, general practices had an average of 2.4 treatment chairs and treated 150 patients per week.

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## Forms of cooperation

Traditionally, dental practices are run single-handedly, with one dentist providing all patient care and managing the business, supported by one or more assistants. There is, however, currently a trend towards greater cooperation, both within and between the different professional groups involved in oral care.<sup>46-48</sup> The proportion of dental practitioners operating single-handedly fell from 76% to 61% between 1997 and 2010.<sup>46</sup> The remaining dentists either work in partnerships with other practitioners (usually two per partnership) or are employed as associate dentists, or else they work for other institutions. In 2010, dentists worked an average of 38 hours per week (32 of which were chargeable).

In 2010, 60% of dental hygienists were employed by a general dental practice. This means that 34% of dental practices employed one or more dental hygienists.<sup>42,46</sup> Around 35% were self-employed in a solo or group practice, and the remaining 5% worked for other institutions (e.g. the municipal health services). Of the latest crop of dental hygienists who have been trained under the four-year curriculum, 90% work in dental practices (either full-time or part time).<sup>49</sup> Nearly all dental practices (97%) employ dental assistants or preventive dentistry assistants.<sup>46</sup> Five percent of practices have their own denturist. Twenty-five percent of practices employ a practice manager.

## Referral relationships

Nearly all dentists refer patients to a maxillofacial surgeon, an orthodontist or a dental hygienist, and 30% refer patients to a denturist.<sup>46</sup> Nearly all dentists refer patients to sub-specialised colleagues and 34% have patients referred to them from other dentists. Thus, oral care providers maintain extensive referral relationships amongst themselves, but it is relatively rare for them to routinely refer patients to other primary healthcare professionals. Only 8% of dentists collaborate regularly (e.g. maintain a referral relationship) with general practitioners, pharmacists, speech therapists or physiotherapists.<sup>46</sup>

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### **3.2 Quality-related aspects of oral care**

Quality of care is currently high on the social agenda. The generally accepted definition of quality of care was formulated by the Institute of Medicine (IOM) in 2001<sup>50</sup>:

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Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.

This definition of quality emphasises the ultimate contribution that care makes to individual and public health. Based on the above definition, six quality objectives are identified in relation to care: timeliness, accessibility, safety, patient-centeredness, patient safety, effectiveness, and efficiency.

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### 3.2.1 *Timeliness and accessibility of oral healthcare*

Timeliness and accessibility mean that people who require care can access that care in a timely manner without encountering major obstacles, regardless of their personal characteristics. A basic prerequisite for accessibility and timeliness of care is the availability of sufficient qualified care providers. The Dutch Healthcare Authority (NZa) concluded in 2009 that supply and demand for oral care at national level were in equilibrium, even though shortages might arise in a few regions.<sup>51</sup> In 2010 the *Capaciteitsorgaan* (an advisory body on healthcare training needs) estimated that training capacity for dentists and dental hygienists would need to be expanded in order to meet future demand.<sup>52</sup> According to the survey conducted by the NMT in 2010, 16% of practices had the capacity to accept patients unconditionally, while 60% accepted patients under certain conditions (e.g. having a family or other relationship with a registered patient).<sup>46</sup> In virtually every case, patients who required emergency treatment were given an appointment within 24 hours. For periodic check-ups, patients obtained appointments within two weeks in 38% of the practices, while appointments for treatments were obtained within two weeks in 25% of the practices.

There are a number of access barriers to oral care, especially for groups with special needs. Mobility problems, for example, can hinder access to general practices for the elderly and people with physical disorders. Major psychological barriers exist for anxious patients and people with mental health problems. Young children are dependent on their parents for timely visits to the dentist and require a specific approach from the care provider. The fact that oral care for adults is privately funded means that there may also be financial barriers to access, regardless of the question of whether care is paid for by the patients themselves or from supplemental insurance. All of the available supplementary insurance policies are intended as maintenance packages, not risk-based packages. In other words, the costs of treatment are only reimbursed up to a certain maximum amount, which is sufficient for basic maintenance but does not

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cover major interventions or accidents (at least not entirely). Furthermore, strict selection criteria may be applied if an uninsured adult wishes to take out a policy. People at high risk for dental problems do not fulfil the selection criteria for supplementary insurance policies. The TNO's *Oral Health for Adults* survey revealed that 10% of the participants sometimes postpone a treatment or do without it because of the costs.<sup>25</sup> The extent to which cost is a barrier to access to oral care or the choice of a given treatment has not been established yet.

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### 3.2.2 *Patient safety within oral care*

Patient safety means that there is no risk of a patient suffering injury through the failure of care providers to act in accordance with the required standard of professional care. Several recent developments within oral care may have implications for patient safety. For example, there are an increasing number of treatments for which patients are referred to other oral care providers (dental hygienists, dentists and dental specialists) and more and more tasks are being delegated to assistants. It is conceivable that this may increase the likelihood of errors, especially if records are not kept properly up to date. Furthermore, new technological developments are associated with new risks. Examples of these developments are the outsourcing of the production of dental technology – including crowns, implants and prostheses – to countries outside the EU, the increasing use of biological materials, the use of new forms of x-ray diagnosis, and the use of innovative invasive techniques (e.g. in the field of implantology). Little information is currently available about patient safety within oral care. For example, it is not known whether care providers take standard safety precautions, such as the use of protective equipment to prevent patients inhaling or swallowing sharp instruments. There is no systematic form of incident recording and analysis. Research based on examination of patient records revealed that eight incidents occurred per thousand patients in 2009.<sup>53</sup> This means that around 100,000 incidents occur in the Netherlands every year. The authors of the study conclude that incident reporting probably does not occur throughout the profession and that record-keeping is inadequate in many practices.

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### 3.2.3 *Patient-centeredness within oral care*

Patient-centeredness means that care is tailored to the needs, wishes and values of the patient. Key factors influencing patient perceptions are the technical expertise of the dentist and the interpersonal relationship.<sup>54</sup> In the patient survey conducted by the NMT in 2009, which included 4,047 patients from 32 dental

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practices, the large majority of interviewees rated the various aspects of the treatment provided by their dentist as either good or very good.<sup>55</sup> The survey participants gave their dentists particularly high scores in relation to treatment outcome, professional expertise, hygiene, care taken to save a tooth, and ability to deal with children. The treatment provided by dental hygienists and/or preventive dentistry assistants is also rated as either good or very good by the majority of the patients (90% or more). The patients respond less positively in relation to the information that the dentist provides about the costs of treatments, the possibility of reimbursement by the health insurer, and the possibility of getting a second opinion from another dentist. The Federation of Patients and Consumer Organisations in the Netherlands (NPCF) has conducted a number of surveys on oral care. The 1,883 participants in its 2009 survey gave their dentist an average score of 7.6 out of 10.<sup>56</sup> In this report the NPCF states that even though patients indicated that they were satisfied with the quality of their dentist, it is difficult for them to find out whether a dentist is delivering good quality. According to the NPCF, care providers and users should both endeavour to provide or obtain information prior to treatment. The TNS-NIPO report *Consumenten aan de tand gevoeld*, based on an NZa-commissioned survey of consumer views on oral care involving 954 adults, likewise indicates that most patients (97%) are either satisfied or very satisfied with their current dentist.<sup>57</sup> However, 23% of interviewees indicate that they have, at some time, changed their dentist due to dissatisfaction. When questioned further, the interviewees expressed a need for clearer information on pricing, more information on the quality of care providers, and clearer invoices, but this is not directly reflected in their satisfaction with the care provider. The NZa concluded in its 2009 vision statement that there is a lack of accessible, reliable, comprehensible and comparable information on oral care; in other words: a lack of transparency, especially in relation to the quality of care.<sup>51</sup>

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### 3.2.4 *Effectiveness and efficiency of oral care*

Effectiveness reflects the extent to which an objective is achieved, whereas efficiency (or cost-effectiveness) indicates the relationship between the achievement of a given outcome and the resources that are used in doing so. Effective and efficient delivery of care means that no under- or overtreatment occurs, i.e. there is an appropriate assessment of the patient. If diagnosis or treatment is indicated, it must be performed according to the professional standard. According to the Committee, proper professional supervision and consideration of long-term outcomes are important elements of efficient oral

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healthcare provision. The promotion of the patient's oral health must be the prime concern. It is noticeable that whereas quite a lot is known about the short-term effects of interventions and treatments, barely any research has been conducted into long-term effects on oral health or into cost-effectiveness. Consequently, it is not currently possible to draw a firm conclusion about the effectiveness and efficiency of oral care. The existence of unfounded, provider-related variations in treatment would suggest that efficiency of care is not always guaranteed. This was one of the reasons for the questions that the President of the Health Council put to the Committee. This topic is further explored in the remainder of this Chapter and used as a steppingstone for the analysis of the contribution that scientific knowledge is making to the quality of care.

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### **3.3 Treatment variation in the delivery of oral care**

The Committee identifies two main reasons for variations in treatment:

- 1 patient-related factors
- 2 provider-related factors.

Given the context of the questions addressed to the Committee, the patient-related factors will be addressed briefly and then the analysis will focus on the provider-related variations in treatment.

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#### **3.3.1 Patient-related treatment variation**

Personal characteristics, patient preferences and differences in individual health status give rise to patient-related variations in healthcare delivery. Variation of this kind is desirable, since a treatment that is suitable for a healthy young person will not always be indicated for a sick elderly person. This principle also applies to oral care: someone with good, stable oral health will need to be managed differently from someone with a high level of caries activity or severe periodontal abnormalities. Cultural background, socioeconomic status and fear of the dentist may also influence clinical decision-making, as may variation in patients' personal preferences. For example, the fact that the patient might expect the dentist to perform a curative intervention may influence the dentist's choice of a particular treatment. Each patient will make their own evaluation of various parameters such as functional restoration and aesthetics, and these choices will not always accord with what the professional would consider optimal.

An important feature of oral care is the fact that it is largely privately funded and, consequently, financial considerations may play a key role in the choice of treatment – unlike in medicine. For instance, for the repair of damage caused by caries, several treatment options will be available to repair the damage and restore function, which may vary in price. The cost may be associated with degree of functionality, aesthetics or technological innovation. Relatively costly restorative treatments, such as crowns and implants (and also extensive periodontal treatments), may not be affordable to all patients, as was discussed previously under accessibility of care. The cumulative effect of less costly treatments can also amount to a substantial sum. Differences between individual patients' ability to pay might therefore be an important reason for treatment variation.

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### 3.3.2 *Provider-related variation*

An important aspect of quality of care is that patients should receive high-quality treatment regardless of which care provider they visit. This means that there should be some degree of uniformity, since care providers all operate within a certain range around the optimum. A substantial degree of provider-related treatment variation is problematic, since some measure of under- or overtreatment can be expected at the margins of the treatment spectrum. In this report, the term “treatment variation” refers to variation in relation to diagnosis and patient assessment. Based on the available literature, it is not possible to determine whether there is also a substantial variation in the technical performance of procedures.

Over the past 20 years research into delivery of care has been conducted in a number of countries, including the Netherlands. Most of the work concerns the diagnosis and treatment of caries (and its consequences). From this research it can be concluded that there is a substantial degree of variation in clinical decision-making among dentists, which is not based on patient-related variables.<sup>58-66</sup> Research shows, for example, that care providers use different clinical criteria for the replacement of restorations.<sup>67-69</sup> The variation in clinical decision-making relates both to decisions on whether to perform an invasive procedure and to the choice of a particular method of restoration.<sup>67</sup> A number of conclusions can be drawn from the various studies about the personal and practice-related characteristics that influence decision-making:<sup>58,61,67,70,71</sup>

- Dentists differ in their style of treatment: some perform a relatively high number of preventive and diagnostic procedures and others a relatively high number of curative and restorative procedures.
- Clinical decision-making among dentists is influenced by personal factors such as: routine use of risk assessment, the sex of the dentist, number of years since graduating, age, university attended, continuing education received, and variables relating to practice organisation.

Little is known at present about variation in the attitudes of dental hygienists and its impact on the delivery of care.

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### **3.4 Tools for measuring quality of oral care in the Netherlands**

In 2000 NIVEL conducted a survey of efforts made by eleven different medical and paramedical professional groups to implement quality policy.<sup>72</sup> For the purposes of comparison, the professional groups were classified according to the stage that they had reached in developing their quality policy. Phase 1 meant that no concrete activities had yet been developed, phase 2 that a few isolated activities had been developed and that further development and implementation were under way, and phase 3 that the profession was at an advanced stage, both with the development of activities and with the establishment of an infrastructure for implementation and the creation of context. The conclusion drawn by this study was that dentists and paramedical professional groups (including dental hygienists) were in phase 2, as were nursing home physicians and midwives. general practitioners, medical specialists and pharmacists were in phase 3. Occupational health physicians, psychologists, nursing and caregiving professionals, and alternative therapists were in phase 1. The following is a brief overview of the tools that are available to the various professionals involved in oral care as of January 2012.

#### **Continuing education and vocational training**

The quality of continuing education and vocational training courses for dentists is guaranteed by a certificate awarded by the Dutch Association of Dentists (NVT) in cooperation with the various learned societies. Continuing education and vocational training are not mandatory in dentistry in the Netherlands. The large majority of dentists state that they find continuing education important.<sup>61,73</sup> However, data from the NMT strongly suggests that at least 20% of dentists do not engage in any form of accredited continuing education.<sup>74</sup> The NVM has its

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own training institute, known as Dental Courses for Dental Hygienists (DCM). In 2011, 525 students undertook continuing education and vocational training through this training institute. This is not an absolute figure, since each dental hygienist may have followed several DCM courses. There are also other channels that dental hygienists use for continuing education, but the professional association has no information on these.

### Peer review

Unlike other medical professional groups, most dentists have no mandatory peer review system (e.g. visitations or other forms of formal quality control). Exceptions are dentists who are registered as periodontists, implantologists and endodontists, who have developed their own system of peer review and registration. The NMT supports peer consultation through the IQual programme, in which a quarter of dentists participate. The NVM has set up a voluntary peer review system, in which 774 members were participating as of January 2012. In addition, independent practices have so-called internal visitations through the NVM. Seventy independent practices have been visited in recent years.

### Quality registers

The Dutch Dentists' Quality Register (KRT) was set up by the NMT in 2007 and is also open to non-members. Besides entry in the *BIG* register, KRT registration also requires dentists to declare the average number of hours that they work, the continuing education undertaken and the hours spent studying specialist literature. The controls on this largely self-reported data are unclear. As of the beginning of 2012, around 4,400 dentists were registered in the KRT (out of a total of nearly 9,000 practising dentists). Since 2009 the NVM has had its own quality register, in which 1,100 of the 2,500 practising dental hygienists were registered as of January 2012. Registration requirements include a minimum work experience stipulation and mandatory accredited in-service training. Dental hygienists can also be registered in the paramedics' quality register, which includes 1,470 registered dental hygienists. The Organisation of Dutch Denturists (ONT) has established a professional profile for denturists.

### Certification

In cooperation with the Harmonisation of Quality Assessment in the Healthcare Sector (HKZ) Foundation, the NMT has developed an assessment framework for

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the certification of dental practices. By the start of 2012, twelve certificates had been awarded to dental practices.<sup>75</sup> In addition, it is possible to obtain an ISO certificate. Prosthodontic practices can either obtain a HKZ certificate or one awarded by their own professional organisation, the ONT.

## Complaints schemes

Under the Client's Right of Complaint (Care Sector) Act (WKCZ) dentists are legally required to belong to a complaints scheme. The NMT and the Association of Dutch Dentists (ANT) both have a complaints scheme. It is also possible to submit a complaint to the Oral Care Guarantee Fund (SGM) if the practitioner belongs to that scheme. The NMT complaints scheme, which is used by around 77% of the active members of the profession, received 585 complaints in 2010. In the majority of cases the complaint could be resolved through mediation.<sup>76</sup> The 750 self-employed dental hygienists who belong to the NVM are automatically registered with the Primary-Care Paramedics Complaints Committee through their membership.

## Indicators

The development of quality indicators for oral care is still in its infancy, both at national and international level. In April 2011 the Visible Oral Care Steering Group established a set of eighteen broad-based indicators relating to the safety, effectiveness, client-centeredness and efficiency of oral care.<sup>77</sup> These indicators are still in the testing phase.

## International indicators

In its recent report *Advancing Oral Health in America* the IOM names a number of specific obstacles that are impeding the development of indicators for oral care,<sup>78</sup> which are also applicable to the Dutch situation:

- there are hardly any evidence-based guidelines for professional practice that can serve as standards for the establishment of indicators
  - there is a lack of suitable clinical registration systems and information technology systems
  - although there is a comprehensive coding system for monitoring oral care procedures, there is no universal diagnostic coding system. This means that it is possible to monitor which procedures have been carried out, but not why. In other words, there is no information on indications for treatment.
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## Guidelines

Working with guidelines is now common practice in the medical world (medicine, nursing, psychiatry). The Dutch Council for Quality of Healthcare defines a guideline as follows:

Document containing recommendations designed to support healthcare professionals and service users, aimed at improving the quality of care, based on scientific research supplemented with expertise and experiences of healthcare professionals and service users.<sup>79</sup>

Underlying this definition is the assumption that a guideline will have been developed in accordance with evidence-based principles. This means that current scientific evidence is integrated with the clinical expertise of the professionals at whom the guideline is aimed. As high-quality scientific evidence is often lacking and can rarely be generalised, and because not all variables implicated in care can be scientifically evaluated, the professional group's experiential knowledge is essential when developing guidelines. Guidelines form part of the professional standard, contain normative statements and, because of this, they have legal significance. It is possible to deviate from a guideline, but this must be justified. The care provider should consider whether, under certain circumstances or in the case of a particular patient, actions other than those recommended in the guideline are indicated. A guideline translated locally into an instruction that is aimed at daily practice is known as a protocol.

Although a number of guidelines have been published for use in oral care, in most cases these have neither arisen through a systematic procedure, nor been widely implemented. They are mainly guidelines relating to the organisation of care or else preventive protocols. Systematic development and implementation of evidence-based guidelines by the professional group is a relatively rare occurrence in the Netherlands (see Section 3.5).

### The professional standard

The Dutch Council for Quality of Healthcare defines the term "professional standard" as follows:

The best course of action in a specific situation, taking recent insights and evidence into consideration, as laid down in guidelines and protocols of the professional group, or the course of

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action that might have been expected in similar circumstances from a member of the profession with average experience and competence.<sup>80</sup>

The term ‘standard’ may relate to the guideline itself or to its content. The professional standard within the field of oral care has hitherto been formulated as follows:

The appropriate form of dental care (as dictated by knowledge and experience) that an averagely competent dentist would undertake in similar circumstances, using methods that are reasonably commensurate with the specific treatment goal.<sup>81</sup>

The Committee recommends that the Council’s definition should be followed in future.

One problem encountered when formulating professional standards and guidelines for oral care is the lack of consensus about what optimal care entails. Generally speaking, the aim of oral care can be defined as the individual achievement and maintenance of oral health. As indicated previously, however, there are several aspects to oral health, for instance: being free from disease, maintaining tooth function, and satisfaction with the condition of the mouth. Based on these definitions, various treatment goals can be formulated for oral care, for example: managing pathological processes in the mouth, technical correction of abnormalities and functional disorders, or adequately meeting the patient's care needs, which should preferably be recorded in an individual care plan. The different interpretations of oral health give rise to uncertainty – at macro level – over the desired outcome of treatments and interventions within oral care.

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### **3.5 The evidence base for clinical practice**

The principle of evidence-based practice means giving due weight to the best available scientific evidence during clinical decision-making in order to arrive at the most effective and efficient treatment for the patient. This approach is becoming increasingly widespread in the medical field. Evidence-based practice also features prominently in the renewed curricula for dentistry and dental hygiene training. However, the evidence-based approach is not yet widely implemented in everyday practice. Box 3 outlines three examples that illustrate the problems surrounding the generation of evidence and the adoption of evidence-based practice in the Netherlands.

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### 3.5.1 *The evidence base for clinical practice*

For most interventions within oral care, only a weak evidence base is available. At the time of writing, the Cochrane Collaboration Oral Health Group has conducted 117 systematic reviews of interventions used in the field of oral health.<sup>82</sup> Half of these (57) were unable to give a definitive answer to the main research question that had been posed because the evidence base was insufficient. In one-third (37) of the reviews it was possible to answer the main research question with reservations (i.e. partially), and in one-sixth (22) of the reviews sufficient evidence was found to answer the main research question in full. The topics covered in these 22 reviews were:

- the use of fluoride as a preventive measure against caries (7 reviews)
- the use of sealants
- the use of paracetamol
- endodontics
- orthodontics
- jaw and temporomandibular joint disorders
- tooth-brushing
- the treatment of cancer patients (5 reviews)
- the bleaching of teeth
- periodontitis (2 reviews).

Around one-fifth (27) of the reviews dealt with restoration of tooth function (i.e. restoration, endodontics and implantology). Only one of these reviews was deemed to provide sufficient evidence to answer the research question. In the case of eighteen reviews, the evidence base was insufficient to provide a definitive answer and in eight reviews a conclusion was drawn on the basis of weak evidence.

**Box 3: Examples of problems surrounding the evidence base for clinical practice**

*The treatment of caries in deciduous teeth*

The treatment of caries in deciduous teeth illustrates two aspects of the problem described in this advisory report.

First, the difficulty of translating scientific knowledge into practice. An academic debate has been in progress for some time about how one should treat caries in deciduous teeth. The two standpoints can be summarised as follows:

- invasive interventions to be kept to a minimum and replaced by an intensive preventive treatment plan;
- restorative intervention.

There is an urgent need for an evidence-based guideline on paediatric dentistry that identifies the treatment option with the best outcome based on the available evidence. This guideline is expected shortly, but the development process has been slow.

The second point illustrated by this example is the unfounded variation in treatment between care providers in everyday practice. Although there is no single academic vision of precisely how caries lesions should be treated in deciduous teeth, there is a consensus among care providers that interventions must always be based on methods that are recognised by the profession. Eighty-seven percent of dentists believe that cavities in the second deciduous molar should always be treated.<sup>87,88</sup> One would therefore expect this to happen in most children. Yet 42% of young children receiving treatment from a dentist have one or more untreated cavities in the second deciduous molar. Dental clinics specialised in children and adolescents have a higher treatment rate.

### *The periodic dental check-up*

Sixty-one percent of visits to dental practices are for a periodic dental check-up. There is a long-standing debate about the optimal interval for the periodic check-up. Many dentists have a fixed patient recall interval (often once every six months or once a year), regardless of the patient's oral health. Whether this is justifiable for the substantial proportion of patients with stable oral health is debatable. There is no scientific evidence that the six-monthly periodic dental check-up is cost-effective.<sup>90</sup> Like any screening procedure, the periodic check-up increases the risk of overtreatment. For the periodic check-up, too, there is variation in treatment, and this is not dependent on patient-related characteristics, but on those of the dentist.<sup>65</sup> Some care providers adopt a standard interval for the periodic dental check-up, whereas others use the patient's risk profile to determine the optimal interval. If standard x-rays are performed during the periodic check-up as a precaution, this will in some cases lead to unnecessary curative interventions (besides the additional radiation exposure). An evidence-based guideline on periodic check-ups has now been published, which is based on individual risk analysis.<sup>85</sup>

### *Removal of wisdom teeth*

The prophylactic removal of asymptomatic, unerupted wisdom teeth is not without costs and involves medical risks for the patient. There is no scientific evidence that the removal of asymptomatic wisdom teeth is effective, or that it prevents such problems as incisor crowding or the development of abscesses.<sup>91</sup> It is therefore not surprising that several authorities advise against this procedure. Nevertheless, many dentists advise their patients to have these teeth removed. An evidence-based guideline has now been developed for the Netherlands which specifies when extraction of the tooth is indicated, and when it is not. Although care providers claim to find this information useful, this guideline is not necessarily always implemented in practice.<sup>92</sup>

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### 3.5.2 *Putting scientific knowledge into practice: developing guidelines for oral care in the Netherlands*

In some areas it can be difficult to translate the available scientific evidence into a form that will benefit practitioners. Although technological innovations (such as digital impression techniques and advances in the field of dental technology) are enthusiastically embraced by the profession, the transfer of new scientific knowledge regarding the effectiveness and efficiency of particular interventions is not so smooth. For example, academic knowledge concerning conservative management of caries has taken over fifteen years to find its way into everyday practice.

Over the past few decades various organisations involved in oral care have developed a number of guidelines. These can be subdivided into evidence-based clinical practice guidelines (CPGs), aimed at supporting clinical decision making, and general practice guidelines aimed at supporting everyday practice. Most of the guidelines that have been developed to date for oral care are either general practice guidelines – examples of the topics addressed being *Second Opinion, Record-Keeping, Horizontal Referral, Out-Of-Hours Services* (NMT) – or preventive protocols on such topics as *Fluoride, Sealants and Erosive Tooth Wear* (Ivory Cross Advisory Board). Four evidence-based clinical practice guidelines have been developed in the past decade:

- The Impacted Asymptomatic Mandibular Third Molar (2003)<sup>83</sup>
- Dental Injuries (2004)<sup>84</sup>
- Periodic Dental Check-Ups (2007)<sup>85</sup>
- Oral Care for Care-Dependent Clients in Nursing Homes (2007).<sup>86</sup>

The NMT developed the CPG on Dental Injuries in cooperation with the Dutch Institute for Healthcare Improvement (CBO). The CPGs on the Third Molar and Periodic Dental Check-Ups were developed as part of the research project on Quality of Care, conducted by the Radboud University Nijmegen Medical Centre (RUNMC). The CPG for Nursing Homes was developed by the Dutch Association of Nursing Home Physicians (NVVA), in cooperation with the NMT and the Dutch Society of Gerodontology (NVG). A further evidence-based guideline is currently under development: *Oral Care for Children (0-13 years)*. This will be implemented in spring 2012. Three CPGs relating to oral care have been developed by the medical community: *Carcinomas of the Oral Cavity and Oropharynx* (2004), *Oral Mucositis* (2007) and *Diagnosis and Treatment of*

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*Obstructive Sleep Apnoea Syndrome* (2009). There is also a National Primary Care Collaboration Agreement (LESA) on anticoagulant therapy and an advisory report on Prevention of Bacterial Endocarditis (2000).

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### 3.6 Conclusions

When discussing quality, the Committee believes that the emphasis must be placed on the contribution that oral care services make to the oral health of individuals and that of the population as a whole. This question cannot be answered for the time being as no data are available on the long-term effectiveness and efficiency of care. Although quality measurement tools are being developed, this process is still at an early stage. As far as quality policy within oral care is concerned, the Committee has the impression that the emphasis has hitherto tended to be on ancillary issues, such as the prevention of infection,<sup>93</sup> rather than on the quality of care *per se*. And when this *is* discussed, the focus is often on the immediate outcome of a single treatment and not on cost-effectiveness in the long term. It is these particular aspects of quality that are most relevant for the purposes of this advisory report on the evidence base for clinical practice. As far as the content of care is concerned, the deficiencies in quality policy give rise to a considerable degree of provider-related variation in diagnosis and assessment within oral care.

According to the Committee, the fact that practice organisation can influence treatment variation is very relevant, in view of the major changes that are taking place in the organisation of oral healthcare in the Netherlands. The increasing number of group practices and the modified pricing structure will affect the quality of care in various ways. As dentistry is traditionally a solo profession, dentists have a strong sense of professional autonomy and they usually rely on analogy and experience when making clinical decisions. Group practices may increase the quality of care, since there is more social control and professional input. On the other hand, it is conceivable that the commercial vision of the management in large practices may influence care delivery in a manner that is not conducive to quality.

#### The evidence base for clinical practice

The evidence base for clinical practice within oral care is relatively weak. This is due partly to the lack of evidence concerning the effectiveness and efficiency of interventions and partly to the period of time it takes for scientific knowledge to

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trickle down to practitioners. Only a few guidelines have been developed using evidence-based methods and these have not yet been properly implemented. This is due in part to the lack of clarity over treatment goals within oral care. The Committee has the impression that the public expectation is still mainly for dentists to repair defects and restore the original anatomical situation. However, restoration of function and improvement of tooth aesthetics are not necessarily synonymous with the achievement of good oral health. For example, if a patient's oral hygiene is poor, the teeth will continue to deteriorate regardless of the quality of restorations.

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# The knowledge infrastructure

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There is little scientific evidence to support the efficiency of interventions within oral care and in some cases scientific knowledge takes a long time to trickle down to practitioners. Why is this? In this Chapter the Committee examines the knowledge infrastructure that exists within the field of oral care: What does the research landscape look like, what type of research is emerging from it, and how are guidelines being developed?

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## 4.1 Scientific research

The research landscape concerning oral health and oral care in the Netherlands is compact and fairly straightforward. There are three academic institutions where systematic research is undertaken: the Academic Centre for Dentistry Amsterdam (ACTA; the collaborating dental faculties of the University of Amsterdam and the VU University Amsterdam), Radboud University Nijmegen Medical Centre (RUNMC), and University Medical Center Groningen (UMCG). The Netherlands Organisation for Applied Scientific Research (TNO) carries out epidemiological research on oral health. The NMT has a network of sentinel sites for practice-related research. This research mainly concerns the organisation of dental practices and the views and behaviours of dentists. NIVEL undertakes occasional research projects, which mainly relate to the supply of care.

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The research capacity at the academic institutions is dictated by the number of scientific staff that is available. The number of PhD positions indicates how many researchers are being trained. In 2010 a total of 57.9 FTE scientific staff were employed at ACTA, the largest academic institution.<sup>94</sup> Of these FTEs, 36.7 were financed directly from the university's budget and 21.3 from other sources of funding. A total of 86 PhD students were employed either full-time or part-time at ACTA in 2010, 60 of whom had a dental background. The UMCG's Centre for Dentistry and Oral Hygiene employed 7.4 FTE scientific staff in 2010.<sup>95</sup> Fourteen PhD students were working part time. RUNMC's Department of Dentistry employed 38.1 FTE scientific staff, 10.3 of whom were financed from the university budget and 28 from other sources of funding. A total of 38 PhD students were working part time at the RUNMC, around 18 of whom had a dental background.<sup>96</sup> The number of FTEs is smaller than the number of scientific staff at all of the institutions, since these are often part-time positions.

A full bibliometric analysis of Dutch research would exceed the scope of this report. What the Committee mainly wished to ascertain is the extent to which the research priority areas overlap with the knowledge gaps in the fields of oral health and oral care as identified in the previous Chapters. In order to answer this question, the scientific, peer-reviewed publications that were published at the academic institutions during 2010 were categorised (Figure 2).<sup>94-96</sup> The Committee has made a distinction between basic research, clinical research, research in the field of social dentistry and health-services research. Individual publications may fall into several categories. Research is considered to be "fundamental" if it relates to the characteristics and/or activity of particular substances/tissues and/or basic functions. Research is regarded as "clinical" if it focuses directly on the treatment of patients. Research is deemed to fall within the field of social dentistry if particular social and/or behavioural aspects of a dental phenomenon are investigated. Finally, "health-services research" is understood to mean research in which attention is focused on the organisation or professionalism of care delivery. An important distinction between fundamental research, on the one hand, and clinical, social-dentistry and health-services research on the other is the fact that the latter categories of research are driven by questions relating to the care sector or to health policy.



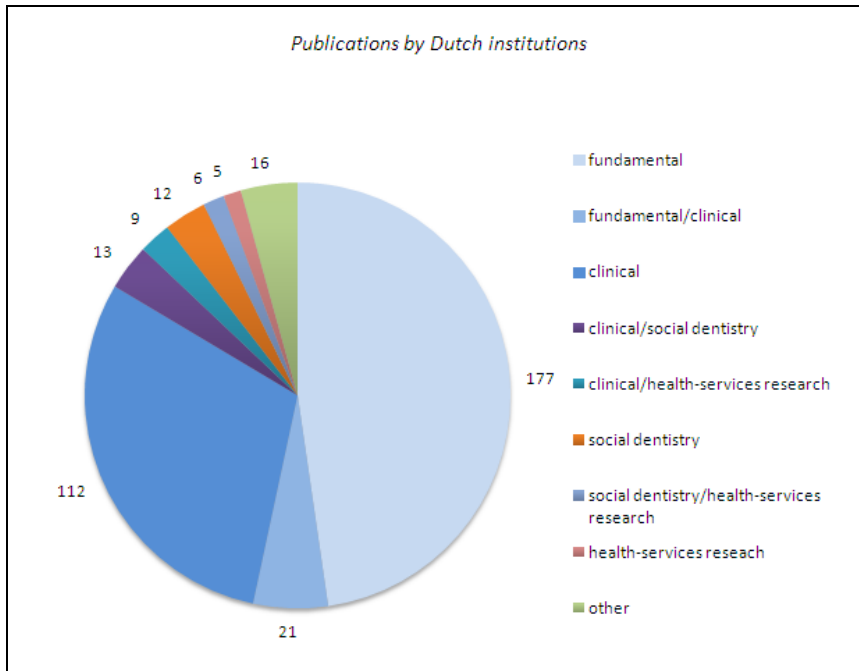


Figure 2.

A number of conclusions can be drawn from scientific output in the Netherlands:

- fundamental research plays an important role in the Netherlands. Nearly 50% of the Dutch publications were classified as purely fundamental research. This means that half of the publications have no direct application to humans. Six percent of the publications concerned research that was partly fundamental and partly clinical
- around 8% of the Dutch publications have a social-dentistry aspect
- around 5% of the Dutch publications are on health-services
- a limited amount of research is performed in the Netherlands on the efficiency and long-term outcome of preventive, diagnostic and therapeutic interventions. Only five of the 354 publications describe research findings of this type, and five of the 354 publications are systematic reviews of this type of research
- a large proportion of the clinical research (61 of the 165 publications) relate to new technological developments and new techniques in the field of curative dentistry.

In order to estimate whether the Dutch situation is comparable with the international situation, a random sample of 300 abstracts from the 2010 annual meeting of the International Association of Dental Research (IADR) were categorised in a similar manner (Figure 3). Although the abstracts for this meeting have not undergone a thorough peer review, they have been subjected to general assessment by scientific Committees of the IADR. This review process is considerably less rigorous than the review conducted for scientific publications. Nevertheless, it gives an impression of what is going on in the research community at international level, especially as in many cases the authors of the scientific literature also make an active contribution to the IADR meetings, as do many members of the research groups to which they belong.

Based on the IADR abstracts, the following conclusions can be drawn about current research at international level:

- around 22% of the current research at international level is fundamental and around 18% is fundamental/clinical
- around 17% of the research relates to social dentistry
- around 5% of the research concerns health services.

A great deal of the published research from the Netherlands and the ongoing research worldwide concerns fundamental and/or clinical questions. In the ongoing research worldwide, there tends to be slightly more emphasis on purely clinical research.

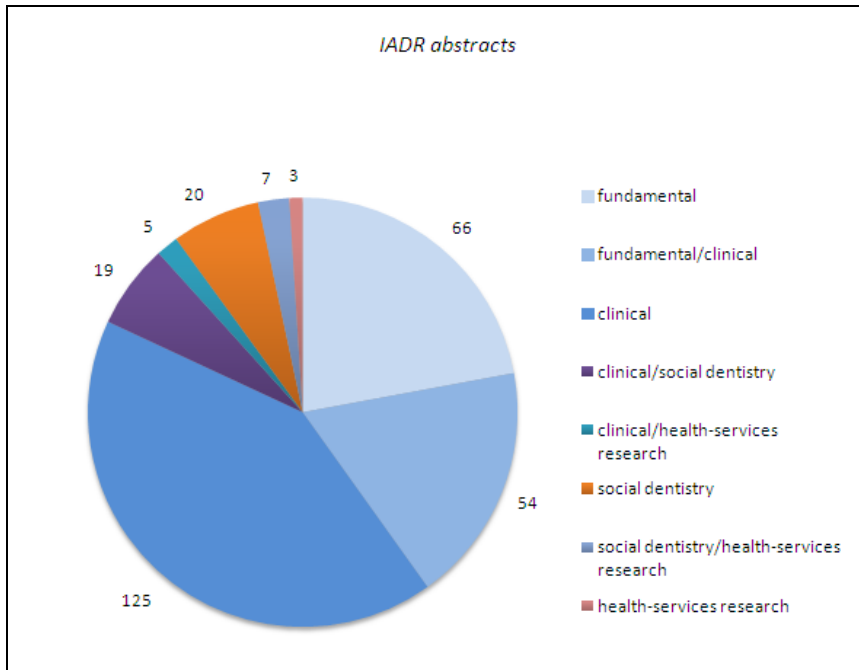


Figure 3.

## 4.2 The knowledge infrastructure for evidence-based guideline development on oral care

Up to now, the development of evidence-based clinical guidelines within the field of oral care in the Netherlands has been relatively unstructured. It is not an integral part of a systematic process of quality assurance and there is no national organisation with responsibility for the long term.

Within the medical community, the learned societies of the various professional groups develop guidelines, or else the process occurs within guideline programmes such as the Dutch College of General Practitioners (NHG) programme. Dentistry also has learned societies, but they are small, and few of them use a systematic method of guideline development, and consequently it is questionable how evidence-based and up-to-date these guidelines are. Currently, there is no central, overarching organisation for evidence-based guideline development within oral healthcare.

Systematic guideline development requires a wide variety of experts: clinicians, experienced epidemiologists and dentists who are skilled in evidence-based search strategies and evaluation of the literature. Few such experts exist within oral care, partly because these skills were not taught in the previous curriculum for dentistry.

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#### 4.2.1 *Development of guidelines on oral care abroad*

To gain an understanding of guideline development elsewhere in the western world the Committee has conducted a global review of the development of clinical guidelines within oral care, confined to guidelines that were available in English. The websites of evidence-based healthcare organisations from countries that are, generally speaking, comparable with the Netherlands as far as level of prosperity, knowledge infrastructure and organisation of oral care are concerned were searched. Furthermore, a wide-ranging search on PubMed was conducted. The resultant documents were subjected to global screening, but not to individual, in-depth analysis. Annex B contains a list of organisations and the search strategy.

Guidelines concerning oral care account for a modest proportion of the total found on the various websites. It is difficult to draw a general conclusion about the quality of the majority of the clinical guidelines in the context of this analysis. The Committee does note, however, that guideline development has been haphazard. It is also noticeable that the word “guideline” is used in various ways (for example: *consensus statement, guidance, guideline, governance, management*). Often it is unclear who is responsible for the development procedure. Furthermore, there is frequently no clear description of the problem, nor any structured, reproducible search strategy for evidence and/or a rating of the robustness of the evidence that has been found. The method now internationally accepted as the gold standard for reliable appraisal of the development procedure – evidence-based guideline development (EBGD), including the AGREE instrument – is rarely found in the guidelines mentioned on the sites that were examined. Exceptions are three clinical guidelines from the United Kingdom, developed by the National Institute for Health and Clinical Excellence (NICE) and the Scottish Intercollegiate Guidelines Network (SIGN), and the five guidelines that have been developed for oral care within the *Haute Autorité de Santé* (National Authority for Health, HAS) in France.

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The search strategy employed in PubMed over a period of five years produced 64 hits. The formulation of most “guidelines” proved to be far removed from the EBGD method. These were mainly scientific papers that describe a method of professional practice whereby a limited group of scientists make assertions about innovations in specific areas of oral care, usually without any input from clinicians. The majority of this list consists of documents written with paediatric dentistry in mind, mostly originating from the United States (American Academy on Pediatric Dentistry Council on Clinical Affairs). There is a clearly discernible overlap with the results from the website search.

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#### 4.2.2 *Implementation and evaluation of guidelines*

The limited number of evidence-based guidelines that currently exist for oral care are not followed to any great extent.<sup>92</sup> Implementation and feedback through evaluation are an integral part of guideline development: it is not sufficient merely to formulate the guideline and disseminate it. Effective ways of encouraging implementation are also still being sought within the medical community.<sup>97,98</sup> Based on the material available, the Committee concludes that there is no consistent evidence of what is the best strategy for implementing guidelines in daily practice.<sup>97,98</sup> There are indications that a combination of various interventions, based on thorough prior analysis of the problems in the field, can lead to effective implementation. This often means that local meetings are organised in conjunction with training and interventions at various levels (patient, care provider and organisations involved). Little is still known about the implementation of guidelines within oral care,<sup>99-105</sup> but the Netherlands has been a leader in research in this area so far, with the IQ healthcare project of RUNMC.<sup>104,105</sup> As part of this project an article was published in an influential scientific journal in 2010 about the effects of guideline implementation on patient care.<sup>104</sup> Additionally, an implementation procedure involving 700 members of staff at fourteen nursing homes is currently under way for the guideline on *Oral Care for Care-Dependent Clients in Nursing Homes* as part of the ZonMw programme *Zorg voor Beter* [“Care for better”] II, with evaluation by the VU University Medical Center.<sup>106</sup>

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### 4.3 Conclusions

#### The research

There is a discrepancy between the type of research that is performed in academic institutions and the need for evidence, as identified in previous chapters. A large proportion of the scientific output of the academic institutions is fundamental research. Little is published on social dentistry research, whereas this type of research is needed in order to answer certain questions regarding the oral health of various population groups and prevention. Health-services research and those areas of clinical research that relate to the effectiveness and cost-effectiveness of interventions make up a tiny fraction of the total body of research. Consequently, questions concerning the efficiency of care delivery remain unanswered. Clinical research focuses primarily on new techniques and technological possibilities for restoration of function.

#### Guideline development

Evidence-based development of guidelines on oral care is hampered by the lack of a functional infrastructure, including a responsible central organisation, professionals with the right background to sit on guideline development Committees, and effective implementation strategies. Central organisations within oral care that stimulate, coordinate and evaluate integrated clinical guideline development are equally absent in other countries. There are a limited number of guidelines concerning oral care that have been developed within overarching national organisations such as NICE (England), SIGN (Scotland) and France's National Authority for Health (HAS).

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## **Answers to the questions put to the Committee and recommendations**

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In the current social context, care providers are expected to demonstrate accountability for the quality of the care that they deliver. According to the Committee, it is therefore not so much a question of *whether* oral care providers will have to meet this obligation, but when and how they will have to do so. The professional groups must take the initiative themselves if they wish to maintain control over the process. This advisory report offers some practical guidance in this area. Reading through the recommendations, one should bear in mind the fact that the principle behind evidence-based practice is that care providers are prepared to account for their clinical actions – what they do, and how and why they do it – both within their own professional group and to the outside world. The Committee is confident that the recommendations in this advisory report are achievable for oral care professionals, as long as there is sufficient support for this fundamental principle.

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### **5.1 The value of knowledge in general, and evidence-based guidelines in particular, for oral health and the quality of oral care**

The first question was:

To what extent can the use of scientific knowledge, and especially evidence-based guidelines, improve the quality of oral care and oral health among the population?

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It has become clear from the previous chapters that the evidence base for oral care is relatively weak and that major efforts still need to be made in relation to quality policy. The Committee is convinced that the use of evidence-based guidelines (alongside other instruments) elsewhere in healthcare has made a positive contribution to the quality of care, and thus to the health of the population at large. One would expect guidelines for oral care also to play a valuable role in overcoming barriers in various areas.

#### The value of guidelines in overcoming knowledge-related barriers

- 1 The Committee finds that in some cases new knowledge (especially concerning technological innovations) is quickly transferred from the research setting to oral health practitioners, whereas in other cases knowledge is transferred slowly. Guidelines are a means of making scientific knowledge more accessible to practising professionals. They can also stimulate scientific debate within professional groups.
- 2 The majority of the research performed within the Dutch faculties is focused on fundamental scientific questions and the development of new techniques. This trend is not confined to the Netherlands but also applies at international level. Consequently, there have been large advances in curative dentistry, whereas research into the efficiency of care has hardly received any attention. The fact that the principal gaps in our knowledge of this area will come to light during the development and application of guidelines will enable the formulation of the most relevant scientific questions to investigate.

#### The value of guidelines in overcoming quality-related barriers

- 3 There is currently a substantial amount of unexplained treatment variation in some areas of care. The development of guidelines is a good way of initiating a professional discussion about quality, the patient assessment process, diagnostic coding, the choice of treatment modalities and patient-related factors. This debate is necessary in order to reduce treatment variation and to increase the continuity – and thus improve the quality – of care.
  - 4 The introduction of the *BIG* Act has created increased opportunities for delegation and reallocation of tasks. In view of the changing relationships between dentists, dental hygienists and assistants, guidelines are an important tool for delegating tasks easily and safely. They can also provide guidance when tasks are reallocated between care providers.
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- 5 The Committee concludes that it is difficult to measure the quality of oral care at present owing to the lack of suitable instruments. The development of guidelines can stimulate the further development of quality-of-care indicators (and vice versa).
- 6 The aspects of oral healthcare services with which patients are least satisfied relate to transparency. The use of guidelines gives care providers a means of showing patients, insurers, and each other that they are delivering high-quality care.
- 7 Generally accepted guidelines give care providers and patients a frame of reference, and they are therefore a safeguard against under- and overtreatment.

### The social value of guidelines

- 8 It is not currently possible to determine the effectiveness and efficiency of the contribution of oral healthcare to public health. Guidelines can assist in determining the effect of care delivery on oral and general health and thus the value of that care.
- 9 The Committee finds that the treatment of the increasing number of people with comorbidities (including frail elderly people) requires a greater exchange of knowledge between the different medical professional groups. Guidelines (multidisciplinary and otherwise) can be of help in this process.
- 10 It is notable that caries is still very common among young children. Guidelines, in conjunction with collective prevention measures, can increase the effectiveness of educational information. This prevention may be aimed either at the entire population or at groups at risk.
- 11 Insufficient evidence is available to determine whether patients with limited financial resources who have to pay for a large proportion of oral care themselves experience barriers in accessing care. Guidelines can provide a platform for discussion of whether essential oral care is affordable and accessible to the entire population. A solid evidence-base is also important for determining which treatments should be reimbursed by insurance programmes.

Although the question is specifically about evidence-based guidelines, the Committee wishes to emphasise that guideline development is also valuable in areas where little scientific evidence is yet available. What is important when developing guidelines is not only the amount of scientific knowledge that is

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available but also the use of a systematic method for reaching a professional consensus and the identification of gaps in the evidence.

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## 5.2 Promoting the development and implementation of guidelines

The second question was:

What can be done to promote the development and implementation of evidence-based guidelines?

### Overarching criteria

The Committee concludes that there are two overarching criteria for the effective development and implementation of guidelines on oral care. The Committee has the impression that most dentists and dental hygienists associate evidence-based practice with scientific research that is far removed from the realities of daily practice. The professional groups will need to be convinced of the benefits of evidence-based practice for oral care. The role of the professionals is all the more important in view of government's limited initiating role in privately funded care. Secondly, the various professional groups involved in oral care must specify what they understand by optimal care. This involves weighing up the quality objectives that were formulated earlier: timeliness, accessibility, patient-centeredness, patient safety, effectiveness and efficiency.

All groups of healthcare professionals that fall under the *BIG* Act have a statutory responsibility to systematically monitor, supervise and improve the quality of the care that is provided within their area of responsibility, including tasks delegated by them.<sup>107</sup> Dentists are academically trained and the only professional group of oral healthcare providers qualified to independently perform certain procedures. For these reasons, the Committee believes that dentists are primarily responsible for initiating the process of evidence-based guideline development. Needless to say, the other dental care professionals, notably dental hygienists and denturists, must be involved in the development and implementation of these guidelines. According to the Committee, it is in the patient's interests that the quality policy of the different professional groups should be viewed collectively. Experience with different medical professional groups shows that fears about the consequences of using guidelines, and more particularly the fear of so-called "cookbook medicine" and medico-legal consequences, are unfounded.

## The prerequisites for evidence-based guideline development within oral care

The Committee believes that successful development and implementation of evidence-based guidelines require the fulfilment of a number of conditions:

### 1 *The supervisory role*

A central organisation with sufficient authority, knowledge and resources to ensure the continuity of the process must take control of prioritising topics for guidelines, the setting up of guideline committees, and the establishment of implementation programmes. This organisation must be firmly established within the dental profession, i.e. with the university departments, learned societies and professional associations. If professional associations are given a role in guideline development then steps must be taken to ensure that this does not conflict with the representation of members' interests. This can be achieved by disconnecting any involvement that professional associations may have in guideline development from their representative role.

### 2 *Establishment of a funding mechanism*

It is essential that an adequate and continuous form of funding should be made available for guideline development. This might be a form of mixed funding, whereby funds may, for example, stem partly (but not exclusively) from increased fees, subsidisation via ongoing quality-of-care programmes and/or a "per mille fund" that is administered by care providers themselves. Insurers would be able to contribute in their capacity as healthcare funders. This does not mean that they would play an active role in the development of guidelines, but that they would financially support practices that conform to the guidelines (e.g. according to the pay-for-performance principle).

### 3 *Training of professionals*

In addition to clinical experts, guideline Committees also require scientifically trained professionals who have the right background to evaluate the scientific literature. Although the renewed six-year curriculum for dentistry will, in time, produce professionals with more knowledge in this area, the pool of suitable candidates is presumably not so great at the present moment. This can, in part, be resolved by offering courses to interested professionals. In the initial stages, the Committee recommends that active support should be obtained from organisations with knowledge of evidence-based primary-care guideline development, such as the Dutch Cochrane Centre, the Dutch College of General Practitioners and CBO/TNO.

### 4 *Gathering information from the field*

Little information is currently available about diagnosis, assessment and

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evaluation of the treatment of patients in general practice. The establishment of an internationally accepted registration system is a challenge, not least due to the lack of a uniform system for diagnostic coding. Nevertheless, it is important to start this information gathering process, since it provides the basis for the development of guidelines and the evaluation of their implementation. The most obvious way to obtain this information is through sentinel sites for registration. Registries of this kind serve several purposes:

- they show where treatment variation – and thus the need for guidelines – is greatest
- if guidelines are introduced, the registry data provide information concerning compliance
- information systems provide feedback data for the care providers themselves.

5 *Addressing research issues from everyday practice*

The current research infrastructure within dentistry is not designed for the sort of research that is needed as a knowledge base for the development and evaluation of guidelines. For this type of research the Committee proposes setting up a network of practices that are closely linked to the universities. This proposal is discussed in more detail below.

6 *Continued development of quality policy*

In order for implementation of guidelines to be successful, the Committee believes it is essential that the various professional groups within oral care should continue to develop a transparent and functional quality assurance system. In the short term, this means refining and expanding the existing instruments, with the emphasis on accreditation.

In the short term: establishment of best practices in areas where there is major treatment variation

It will take a substantial amount of time before sufficient research has been organised, carried out, and made available for evidence-based guideline development. In the meantime a temporary alternative is needed. The clinical experience amassed by professionals constitutes a large body of knowledge that could at least provide a temporary platform on which to base guidelines. Even if there are major gaps in scientific knowledge on a particular topic, a properly constituted Committee can systematically establish a consensus guideline based on ‘best practice points’.

Guidelines add particular value in areas where treatment varies significantly, or where there is a major discrepancy between standard patterns of practice and scientific knowledge (especially new knowledge). Professionals are generally aware of which areas these are and can therefore identify and prioritise them. Next, a systematic method can be used to establish guidelines for the high-priority topics. During the search for information the principal gaps in the evidence will be revealed. This may lead to recommendations for follow-up research and, ultimately, to the development of evidence-based guidelines.

The Committee notes that it sometimes may be possible to adopt a “light” procedure whereby evidence-based guidelines from abroad are adapted to suit the local situation. This would be a safe and rapid way of getting guideline development underway.

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### **5.3 Priorities relating to knowledge infrastructure and research**

The third question was:

In light of the answers given to question 1, what are the priorities as far as knowledge infrastructure and research are concerned?

The Committee has established that guidelines can prove valuable in overcoming barriers relating to knowledge and quality of care and can thereby have a positive effect on the oral health of the population. In addition to the prerequisites for guideline development, there are a number of steps relating to knowledge infrastructure and research that can stimulate the development of evidence-based guidelines:

1 *The establishment of a national oral health monitor*

As is evident from Chapter 2, there are currently a number of significant gaps in our knowledge of oral health in the Netherlands. Important data are missing with regard to vulnerable groups. In particular, the Committee is concerned about the group (probably a large one) of frail elderly people who experience problems with oral health. As far as young people are concerned, there is still a lack of knowledge about effective methods for promoting the prevention of caries and erosive tooth wear. The associations between ability to pay, ethnicity or level of education, and oral health and variation in availability of care have hardly been investigated at all. Finally, virtually nothing is known about regional differences. For all these reasons, the

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Committee recommends setting up a monitor of oral health, which would detect regional differences and take account of groups at risk.

2 *The establishment of oral-care practices for research*

The Committee stated previously that certain key issues, notably in relation to the effectiveness and efficiency of care delivery, are rarely addressed by the academic research community. It has also been noted that the perception of scientific research among professionals is that it is far removed from the realities of their daily practice. The Committee sees two interrelated possibilities for bridging this gulf between academia and everyday practice. The first is to establish a network of “general practices for research”. This would have the positive effect of actively involving practitioners in the process of improving the coordination between science and practice. Following on from this, the second possibility is to establish a network of practices with strong links to academia. Working in close cooperation with academic institutions, these practices would offer a combination of exemplary care, instruction and training, and/or scientific research. This option has demonstrated ample benefits in other areas, notably in the fields of family medicine and public health. In both cases, the research would be designed to fill gaps in the scientific evidence identified during the guideline development process.

3 *Provision for oral care within existing ZonMw programmes*

In conjunction with the establishment of the infrastructure, existing ZonMw programmes (e.g. the Prevention programme, the Efficiency programme and/or the proposed future programme on Quality of Care) should create space for topics associated with oral care.

4 *Broadening career opportunities within oral care*

When the prerequisites for guideline development were outlined, it was mentioned that there are currently too few professionals with the necessary scientific expertise for guideline committees. One of the reasons for this is that there is not enough incentive to combine work within a dental practice with various scientific activities. The Committee recommends that consideration should be given to different types of career path for motivated professionals who are not seeking an exclusively practical or academic career. The establishment of academic partnerships as recommended above is an example of such an option as it broadens the opportunities for practising dentists and dental hygienists to carry out research (be it doctoral or otherwise) and/or to teach.

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- A The Committee
  - B The use of clinical guidelines within oral care: an international review
  - C Summary of recent epidemiological data

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## Annexes





# A

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## The Committee

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- Prof. E. Schadé, *Chairman*  
Professor of General Practice and Family Medicine, Academic Medical Center Amsterdam
  - Prof. W.J.J. Assendelft  
Professor of General Practice and Family Medicine, Leiden University Medical Centre
  - Dr. J.J.M. Bruers  
Sociologist, Dutch Society for the Promotion of Dentistry, Nieuwegein
  - Dr. J. den Dekker  
Dentist, Dental Adviser, Health Care Insurance Board, Diemen
  - Prof. A.J. Feilzer  
Dean, Professor of Dental Materials Science, Dental Practitioner, Academic Centre for Dentistry Amsterdam
  - Dr. K. Jerkovic-Cosic  
Dental Hygienist/Epidemiologist, Hanze University of Applied Sciences Groningen/University of Groningen
  - J.A. Kieft  
Dental Practitioner, Dental Adviser, Coöperatie VGZ (a not-for-profit healthcare insurer), Broek op Langendijk
  - Dr. T.G.P.H. Mettes  
Researcher in Dentistry, Dental Practitioner, Radboud University Nijmegen Medical Centre, Nijmegen
-

- R. Rowel  
Dental Practitioner, Raalte
- Prof. R.M.H. Schaub  
Emeritus Professor of Oral Health Care, Dental Practitioner, University Medical Center Groningen
- M. Schoneveld  
Policy Adviser, Dutch Consumers' Association, The Hague
- Dr. A.A. Schuller  
Dentist/Epidemiologist, TNO, Leiden
- Prof. B. Stegenga  
Professor of Oral Health Care and Clinical Epidemiology, Maxillofacial Surgeon, University Medical Center Groningen
- Prof. G.H.W. Verrips  
Special Professor of Oral Health and Quality of Life, TNO/Academic Centre for Dentistry Amsterdam
- P.S.B. Boom, *observer*  
Ministry of Health, Welfare and Sport, The Hague
- Dr. G.A.J. Soete, *Secretary*  
Health Council of the Netherlands, The Hague

#### The Health Council and interests

Members of Health Council Committees are appointed in a personal capacity because of their special expertise in the matters to be addressed. Nonetheless, it is precisely because of this expertise that they may also have interests. This in itself does not necessarily present an obstacle for membership of a Health Council Committee. Transparency regarding possible conflicts of interest is nonetheless important, both for the chairperson and members of a Committee and for the President of the Health Council. On being invited to join a Committee, members are asked to submit a form detailing the functions they hold and any other material and immaterial interests which could be relevant for the Committee's work. It is the responsibility of the President of the Health Council to assess whether the interests indicated constitute grounds for non-appointment. An advisorship will then sometimes make it possible to exploit the expertise of the specialist involved. During the inaugural meeting the declarations issued are discussed, so that all members of the Committee are aware of each other's possible interests.

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## **B**

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# **The use of clinical guidelines within oral care: an international review**

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### Question

To what extent and how are guidelines developed internationally within oral care?

### Aim

The aim of this review is to provide a comparative overview of guideline development in the Netherlands and elsewhere in the Western world.

### Method

Two strategies have been used:

- websites of evidence-based healthcare organisations have been searched
- a wide-ranging search has been conducted in PubMed.

When selecting websites, we have chosen countries that are generally comparable with the Netherlands as regards level of prosperity, knowledge infrastructure and organisation of oral care. The guidelines that were examined had been published in (or translated into) English. The resultant documents have undergone a global screening process, without subjecting them to individual, in-depth analysis.

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The websites consulted:

<http://www.g-i-n.net/>; Guidelines International Network, Supranational Network  
<http://www.clinicalguidelines.gov.au/>; Clinical Practice Guideline Portal  
(Australia)

[http://www.cmaj.ca/cgi/collection/clinical\\_practice\\_guidelines](http://www.cmaj.ca/cgi/collection/clinical_practice_guidelines); Clinical Practice  
Guideline (Canada) CMAJ

<http://www.nzgg.org.nz/>; New Zealand Guidelines Group

<http://www.nice.org.uk/Guidance/Topic>; UK Guidelines

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

<http://www.ahrq.gov/clinic/ngcfact.htm>; The National Guideline Clearinghouse,  
AHRQ, US Department of Health

[http://www.fdiworldental.org/guidelines-for-continuing-professional-](http://www.fdiworldental.org/guidelines-for-continuing-professional-development)  
development; FDI World Dental Federation (restricted to members only)

<http://www.tripdatabase.com/> ; UK founders linked with Centre for Evidence-  
Based Medicine ([www.cebm.net](http://www.cebm.net))

[http://www.has-sante.fr/portail/jcms/j\\_5/accueil](http://www.has-sante.fr/portail/jcms/j_5/accueil); HAS (Haute Autorité de Santé),  
France (<http://bit.ly/hasthk>)\*

<https://www.iqwig.de/> ; IQWIG (Institut für Qualität und Wirtschaftlichkeit im  
Gesundheitswesen), Germany (<http://bit.ly/IQWIG>)

PubMed database:

Search terms: ‘clinical practice guidelines’ AND ‘Dentistry’ (“practice  
guideline”[Publication Type] OR “practice guidelines as topic”[MeSH Terms]  
OR “clinical practice guidelines”[All Fields]) AND (“dentistry”[MeSH Terms]  
OR “dentistry”[All Fields]) AND (“humans”[MeSH Terms] AND Practice  
Guideline[ptyp] AND English [lang])

Limits: Humans, Practice Guideline, English, published in last five years.

Period: 2005-2011

In this section use has also been made of a recent search conducted in 2010 of the  
ongoing development procedure concerning the guideline on Oral Care of Young  
People, drawn up by the TNO/CBO. Here an extensive search was undertaken  
for evidence of effective dissemination and implementation strategies within oral  
care. The search strategy is queryable.

## Results for guidelines on international websites

As shown in Table 1, the international electronic search produces hits from Australia (AUS), Canada (CAN), France (FR), Germany (GER), England (ENG), New Zealand (NZ), Scotland (SCO), United States (US) and Wales (WLS). Clinical guidelines developed according to the EBGD method are mainly found at SIGN (SCO) and NICE (ENG) and, to a lesser extent, at HAS (FR) (Table 1).

*Table 1* Guidelines on international websites between 2003 and 2011 (by number, topic and country of origin).

Guidelines	n	Country of origin
Anaesthesia (local, general)	6	ENG, USA, FR
Tooth and dental development	2	ENG, USA
Paediatric dentistry, general	4	USA, SCO
Periodontitis	3	USA, FR
Nutrition	2	ENG, USA
Erosion	1	ENG
Recall*	1	ENG*
Prophylaxis	5	USA, ENG
Caries, general	2	USA, SCO, CAN, FR*
Caries risk, children*	4	
Surgery	3	USA, GER
Trauma	1	USA
Pregnancy	2	USA
Fluoride	5	USA, GER, NZ
Resuscitation	1	ENG
Sealant*	3	USA, GER, WLS, FR*
Third molars*	5	USA, GER, SCO*, ENG*
Oncology	3	USA
Endodontics	1	USA
Pulp problems	2	USA
Special dentistry	1	USA
Endocarditis	1	AUS
Obstructive sleep apnoea syndrome	1	GER
Implants for tooth replacement	1	GER
Postoperative pain	1	FR
Indications for synthetic fillings	1	FR

\* developed according to EBGD method

AUS: Australia / CAN: Canada / FR: France / GER: Germany / ENG: England / NZ: New Zealand / SCO: Scotland / USA: United States / WLS: Wales

## Results for international clinical guidelines from PubMed

The search conducted in PubMed over a five-year period produces 64 hits. For the most part, this list consists of documents relating to paediatric dentistry, mainly originating from the United States (American Academy on Pediatric Dentistry Council on Clinical Affairs). A clear overlap is discernible with the results from the website search. However, complete dentures (USA), surgical periodontics (USA, Italy), temporomandibular joint problems (Belgium), trauma (Denmark) and dementia (ENG) are topics that were not found on the websites, but did come to light via PubMed.

*Table 2* Guidelines in the Netherlands between 2003 and 2011 (by number and topic).

Guidelines	n	Responsible organisation(s)
Oral care:		
Third molars*	1	RUNMC Dentistry
Trauma*	1	NMT
Periodic dental check-up *	1	RUNMC Dentistry
Fluoride	1	Ivory Cross
Sealant	1	Ivory Cross
Erosive tooth wear	1	Ivory Cross
Oral care for care-dependent clients in nursing homes*	1	NVVA, NMT, NVG
Oral care for young people (in development)	1	NMT
Medicine:		
Diagnosis/treatment of obstructive sleep apnoea syndrome*	1	NVALT
Oral mucositis*	1	V & VN Oncology, NIVEL, LEVV, RUNMC, VIKC
Oral cavity and oropharyngeal carcinoma*	1	KNO
* developed according to the EBGD method		
RUNMC: Radboud University Nijmegen Medical Centre, Nijmegen		
NMT: Dutch Society for the Promotion of Dentistry, Nieuwegein		
NVVA: Dutch Association of Nursing Home Physicians, Utrecht		
NVG: Dutch Society of Gerodontology, Apeldoorn		
NVALT: Dutch Association of Physicians for Lung Disease and Tuberculosis, 's-Hertogenbosch		
V & VN Oncology: Dutch Oncology Nursing Society, Utrecht		
NIVEL: Netherlands Institute for Health Services Research, Utrecht		
LEVV: Netherlands Centre of Excellence in Nursing, Utrecht		
VIKC: Dutch Association of Comprehensive Cancer Centres, Utrecht		
KNO: Netherlands Society for Oto-Rhino-Laryngology and Cervico-Facial-Surgery, Utrecht		

The additional search strategy with regard to international research into the effectiveness of dissemination and implementation strategies for healthcare guidelines produces only modest results as far as oral care is concerned. There is research from Scotland and recent research from the Netherlands.<sup>99,104,105</sup>

### Guideline development in the Netherlands

Several practice guidelines have been developed in recent decades by various organisations within oral care (Table 2).





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# Summary of recent epidemiological data

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The Health Care Insurance Board (CVZ) regularly commissions research from TNO on the oral health of children and adults. The recent epidemiological trends described here mainly stem from these research reports, the ACTA/TNO *Kies voor Tandem* report (formerly the Dental Services for Young Health Insurance Scheme Members, TJZ), and the *Oral Health for Adults* report.<sup>20,25</sup> A key feature of these epidemiological figures is the fact that the data concerning children are only collected in four locations (‘s Hertogenbosch, Gouda, Alphen aan den Rijn and Breda) and the data on adults come from just one location (Den Bosch). This means that the results cannot simply be extrapolated to national level. For various reasons there may be regional differences in the absolute numbers relating to oral health. It can be assumed, however, that trends (i.e. relative differences over time) observed in these areas will apply to the country as a whole. Where other data have been incorporated, a note is made to this effect.

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### Epidemiological trends among children

Epidemiological data concerning various aspects of oral health in young people have been systematically collected on behalf of the Health Care Insurance Board (CVZ) since 1987, with the aim being in part to monitor the effect of system changes. The principal findings of the most recent interim assessment of the *Kies voor Tandem* project, which was conducted in 2009 among young people aged 9, 15, and 21 years,<sup>20</sup> are summarised here, together with the main points from the

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#### **Box 4: How are differences in caries experience between different groups measured?**

A number of indices have been developed with a view to quantifying the clinical symptoms of oral diseases. The best-known index for measuring the accumulated damage caused by caries is the DMFT or DMFS index. This index calculates the total number of Decayed Missing or Filled Teeth/ Surfaces and has been widely used in epidemiological research at international level for several decades. Various modifications have been made to the index for different purposes. Although the validity of all these indices is not optimal, the DMF remains the best available and most widely used method for comparing caries experience between groups. The index is intended to draw comparisons between groups of people and not for diagnosis at individual level. The index mainly reflects cumulative caries damage and not the pathological process at the time of measurement; after all, the level of caries activity cannot be observed with the naked eye. Nevertheless, it is true to say that a high level of caries experience is the best predictor for new and ongoing disease. A final shortcoming of the index is the fact that it assumes that all missing teeth have been lost as a result of caries, whereas there may be a number of other reasons.

recently published meta-analysis of epidemiological caries surveys among Dutch children aged 5-6 and 11-12 years.<sup>25,89</sup>

The 2009 study is the first to have been performed after the system was changed in 2006, when the distinction between privately and health fund-insured young people was abandoned. In order to describe trends during the period 1990-2009 the research has been stratified by socioeconomic status (SES) rather than by type of insurance. The research comprised a clinical part and a questionnaire. The principal conclusions are as follows:

#### **Caries**

- Caries is still a common condition among young people. Around half of the 9-year-olds who participated in *Kies voor Tandem* in 2009 had caries in their deciduous teeth and one-fifth had it in their permanent teeth, while around

- half of the 15-year-olds – and more than three-quarters of the 21-year-olds – had caries experience in their permanent teeth.
- There is a considerable difference in the level of caries experience between young people with low SES and young people with high SES (Table 3).
  - The number of 20-year-olds with sound teeth increased in the period 1990-2009. Among young people with low SES, there is also an increase in the number of 14-year-olds with sound teeth.
  - Compared with 2003, no major differences can be observed in the level of caries experience among young people in 2009. The observable trends are positive: both the 9-year-olds and the 15-year-olds have less caries experience. There is no difference among the 21-year-olds.
  - The trend in caries experience among young children is still unclear. The last survey performed among young health fund-insured children in the four above-mentioned municipalities (in 2005) showed a slight trend towards deterioration. The proportion of health fund-insured 5-year-olds with caries-free deciduous teeth was 55% in 1992, 51% in 1999, and 44% in 2005. However, the conclusion of the meta-analysis of caries surveys among 6-year-olds between 1980-2009 is that the prevalence of caries has not changed significantly since the mid-1980s. One reason for this discrepancy might be the background of the children in the different surveys. The next *Kies voor Tandem* research report to include young children will be published in 2012. Hopefully that report will provide a definitive answer regarding the current situation.

*Table 3* Caries experience among young people with low and high SES. All differences are statistically significant.

Age	Low SES	High SES
% with sound teeth		
9-year-olds, deciduous teeth	39%	53%
9-year-olds, permanent teeth	77%	85%
15-year-olds	42%	53%
21-year-olds	15%	23%
DMFS score		
9-year-olds, DMFS (deciduous teeth)	4.3	2.5
9-year-olds, DMFS	0.6	0.3
15-year-olds	2.6	1.7
21-year-olds	8.5	5.5

## Tooth wear

- The prevalence of non-physiological tooth wear (i.e. loss of enamel so severe that the dentine is visible) in young people has increased sharply in the past ten years. In 2003 one in ten 21-year-olds had non-physiological wear, whereas by 2009 it was one in three. No association with SES was found in the TNO study. The course and aetiology of erosion have been investigated in a longitudinal study of young adolescents from Oss.<sup>21</sup> The average age of the children at the start of the study was 11.8 years and they were monitored for three years. At the beginning of the study 1.8% of the children were found to have wear penetrating deep into the enamel or into the dentine, and three years later this percentage had risen to 23.8%. There are associations between erosive wear in young people and eating and drinking patterns, but the aetiology is complex and several factors are involved.<sup>21,22</sup>

## Orthodontic treatments

- The number of young people who undergo orthodontic treatment has increased sharply in the past twenty years. In the late 1980s only 20% of young adults had worn a brace, whereas this had risen to around 40% by the late 1990s, and by 2009 50% of less well educated, and 64% of higher-educated, 21-year-olds had worn a brace. It appears that the criteria for undergoing orthodontic treatment have changed in the past twenty years.

## Dentist visits

- Frequency of dentist visits is high among the young people from the study population. More than 90% of participants in all groups go to the dentist for a periodic dental check-up at least once a year (9-year-olds: 97-99%, 15-year-olds: 95%, 21-year-olds: 91-92%). SES does not appear to make any difference. Statistics Netherlands (CBS) data show that the percentage of young people who have been to the dentist in the past twelve months has remained at a steady 80-85% for twenty years. This also includes children aged 0-2 years, who generally do not yet go to the dentist.

## Anxiety

- A total of 3-13% of young people are afraid of the dentist.
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## Oral hygiene and behaviour

The TNO study investigated the extent to which the respondents complied with the recommendations made by the Ivory Cross with regard to oral health behaviour and eating habits. Current knowledge concerning caries prevention emphasises the importance of brushing with fluoride toothpaste from the time the first tooth erupts, and limiting the number of food intakes per day. The principal conclusions were as follows (where two percentages are given, the first is for the low-SES group and the second for the high-SES group):

- 77-82% of 9-year-olds, 72-78% of 15-year-olds and 61-70% of 21-year-olds brush their teeth twice a day
- over 60% of 9-year-olds have a moderate or large amount of plaque on their teeth. For the 15-year-olds, it is over 25% and for 21-year-olds, over 20%. As with brushing frequency, there is a correlation with SES. Thus oral hygiene is poorer in younger children than in older children
- nine out of ten 9-year-olds have a maximum of seven food or drink intakes per day and therefore comply with the Ivory Cross dietary advice. Only one-third of the 15-year-olds and 21-year-olds have less than eight food or drink intakes.

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## Epidemiological trends in adults

To monitor the effect of changes to the system, the CVZ commissioned research on oral health among adults in Den Bosch in 1983, 1995, 2002 and 2007. Here we have summarised the conclusions of the research report on *Oral Health for Adults* that are of relevance to this report.<sup>25</sup> The age of the study population in 2007 was 25-74 years. A number of results were compared with the findings from 2002 in order to identify trends. The non-respondents in the study differed from the respondents in certain respects: they were more often male, less well educated and ethnically non-Dutch. Thus the results may possibly present an overly positive picture.

### Edentulousness

- People are keeping their natural teeth for longer and longer. In 1981 32% of the population over sixteen years of age were edentulous (i.e. had none of their own teeth), whereas this figure was only 12% in 2009. The fall in the number of people with dentures has been flattening out since 2000. The

majority (eight out of ten) of the edentulous participants in the CVZ study were over 55 years old.

### Caries experience and oral health

- Looking at the overall state of the nation's teeth, we find that it is more common for younger adults to have all their own teeth than older adults. Nearly all adults have some level of caries experience. The younger age groups have better oral health (as measured by the number of sound teeth, number of missing teeth and the DMF index) than the older age groups.
- There is a clear association between oral health and SES. In the younger age groups, higher-educated people have less untreated caries and fewer restorations than the less well educated; in the older age groups, they have fewer extracted teeth and more restorations. It is also less common for higher-educated people to have complete dentures.
- A comparison of the results for ex-health insurance scheme members aged 25-54-years from 2007 with those for health insurance scheme members of the same age from 2002 reveals that average oral health has improved across all age groups. The DMF score is lower for all groups, i.e. the number of decayed or missing teeth has fallen. Here it must be noted that this reduction has not been identified among the small number of people without supplemental insurance.

### Periodontitis

- 6-17% have one or more deepened pockets (a symptom of periodontitis). Incidence increases with age.

### Complaints

- Three-quarters of the dentate respondents from the survey had experienced oral health problems in the past year. The complaints most commonly mentioned were discolorations (27%), cavities (25%), gingival problems (24%), loose or broken teeth (22%) and problems with eating and drinking (17%). Sixty-eight percent had suffered toothache at some time. Curiously enough, complaints were not age-related. There is no difference between age groups, either in terms of the number of complaints, the pattern of symptoms, or even satisfaction with the teeth.
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- Around a quarter of the respondents have temporomandibular-joint or masseter-muscle problems and around half of this group finds these complaints troublesome.
- There is no association between the level of education and the number of complaints – although less well educated people have a more negative view of their own oral health than those who have received better education.

### Dentist visits

- The majority of the dentate respondents (87%) had been to the dentist in the past twelve months. The CBS data also show that frequency of visits to the dentist remains at a high level in adults. In 2007, 87% of the dentate adults aged 20-65 years had been to the dentist in the past twelve months. Among the dentate over-65s, this figure was 80%.

### Oral health behaviour

The questionnaire survey for *Oral Health for Adults* reviewed oral health behaviour in order to gauge interest in oral health among adults. There is not necessarily any association between self-reported oral health behaviour and clinical outcomes such as presence of plaque.

- Eighty percent of adults brush their teeth at least twice a day, around 18% brush once a day and 3% do not brush every day. Women more commonly brush twice a day than men and higher-educated people more often do so than less well educated people.
- One-third of the dentate respondents use interdental cleaning aids every day, half use them, but not every day, and one-fifth never use them. The youngest age group use them less than the older groups.
- The youngest age group eat snacks more often than the older age groups. This result ties in with the finding that young people frequently have more than seven intakes of food per day.

### Anxiety

- 19% of the adults are afraid of the dentist. This percentage appears to be remaining stable: in 1990, 22% were afraid of the dentist.

## Cancer

- The incidence of oral and throat cancer in the Netherlands is around 1,600 cases per year (around 200 of them being lip cancer, and 850 oral and 550 throat cancer).

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### **Epidemiological trends among elderly people**

Although no specific epidemiological research has been done on the oral health of elderly people, there are a number of findings that shed light on developments in the age group 55-75 years.<sup>24,25</sup>

- The number of edentate elderly people has fallen sharply in the past thirty years. In 1981, 78% of elderly people over the age of 65 had dentures, and 54% of adults aged 45-65 years. In 2009, 41% of the over-65s had complete dentures and only 12% of 45-65-year-olds.

Of the participants in the TNO's 2007 study who were aged 55-75 years and not edentulous, half had a prosthesis or bridge in the upper jaw and a quarter had a prosthesis or bridge in the lower jaw. These people had lost around nine teeth, most of them as a result of caries. On average, they still had nineteen sound or restored teeth.