

Prevention of Dental Caries

A Systematic Review

SBU Board of Directors and Advisory Committee

Secretariat

EGON JONSSON,
Executive Director

SBU Board of Directors

KJELL ASPLUND
Norrland University
Hospital (Chair)

BIBBI CARLSSON
The Swedish Federation of
County Councils

EVA FERNVALL MARKSTEDT
The Swedish Association of
Health Professionals

BERNHARD GREWIN
Swedish Medical Association

THOMAS IHRE
The Swedish Society of
Medicine

TÖRE LÖWSTEDT
The Swedish Federation of
County Councils

NINA REHNQVIST-AHLBERG
National Board of Health
and Welfare

MADELEINE ROHLIN
Faculty of Dentistry, Malmö

ULLA ÅHS
The Swedish Association of
Local Authorities

MARIE ÅSBERG
The Karolinska Institute

Advisory Committee

PETER ASPELIN
Huddinge University
Hospital (Chair)

HANS-OLOV ADAMI
The Karolinska Institute

BJÖRN BEERMANN
Medical Products Agency

DAVID BERGQVIST
Uppsala University Hospital

BIRGITTA BERNSPÅNG
Umeå University

CECILIA BJÖRKELUND
Dept of Primary Health Care

ANN-KATHRINE GRANÉRUS
Linköping University
Hospital

KERSTIN HAGENFELDT
Karolinska University
Hospital

ANNA-KARIN HOLM
School of Dentistry, Umeå

BENGT JÖNSSON
Stockholm School of
Economics

ANDERS LINDGREN
Ministry of Health and
Social Affairs

DAG LUNDBERG
Lund University Hospital

MÅNS ROSÉN
National Board of Health
and Welfare

LIL TRÄSKMAN-BENDZ
Lund University Hospital

GIGGI UDÉN
Malmö University

Summary and Conclusions of the SBU Report on:

Prevention of Dental Caries

A Systematic Review

October 2002

Report prepared by:

Anna-Karin Holm
(Chair)

Susanna Axelsson
(Project Coordinator)

Helena Dahlgren

Göran Hammarsjö

Carina Källestål

Folke Lagerlöf

Peter Lingström

Ingegerd Mejäre

Gunilla Nordenram

Anders Norlund

Lars G Petersson

Åsa Svensson

(Project Assistant)

Birgitta Söder

Svante Twetman

Manuscript reviewed by:

Douglas Bratthall

Ernst Jonsson

Sven Poulsen

Paul Riordan

Eeva Widström

English translation by:

Ron Gustafson

Report: Prevention of Dental Caries • Type: Systematic review

ISBN: 991-87890-81-X • Report number: 161 • Publishing year 2002



SBU Summary and Conclusions

Introduction

Dental caries, also referred to as “tooth decay”, is a disease that appears in all countries and all populations, but varies in scope and degree of severity.

In Sweden, caries increased dramatically during the late 1800s and the early 1900s. Studies conducted in the early 1960s showed that approximately one fourth of those over the age of 16 years were completely toothless due to caries or periodontal disease, and nearly 100 percent of all children and adolescents had caries to a greater or lesser extent.

How does caries start?

Bacteria attaches to the thin layer of biofilm found on all surfaces in the mouth, forming dental plaque on the teeth. Bacteria in the biofilm feed mainly on substances in the saliva, but many of them can use the sugar in our diet and convert it into acid, mainly lactic acid. This causes the pH value to fall, and protons, hydrogen ions, find their way in among the calcium phosphate crystals that form the tooth surface. Eventually, they partially dissolve and the released calcium and phosphate ions move out from the tooth, ie, demineralization. With a reduction in access to sugar, acid production declines, the pH value increases, and some recovery occurs. The tooth substance is rebuilt partly from the calcium and phosphate that remains in the fluid surrounding the tooth crystals, ie, remineralization. Initial demineralization is not visible to the naked eye. However, if acid is allowed to attack often and remineralization does not occur, then more mineral dissolves and an early caries lesion becomes visible as a white, chalk-like spot on the tooth surface. Initial caries lesions of tooth surfaces that are in contact with each

other are also visible by x-ray examination. An initial lesion may heal, but often remains as a “scar”, an opaque and perhaps darkened area on the tooth surface. If the initial lesion does not heal and additional mineral is dissolved, the enamel surface disintegrates and a cavity forms. This occurs at a rather late stage of the caries process.

The strength of the “attacking” factors, ie, the composition and amount of bacteria, and their access to sugar, determines the progression of the caries process. Saliva is the most important defense mechanism. It helps keep the tooth surface clean and dilutes sugar concentration. Saliva also has the ability to resist pH changes. Furthermore, it provides calcium and phosphate ions that contribute to remineralization of the tooth surface.

Where does caries start?

Most commonly, caries is found on the occlusal surfaces of the teeth that have deep fissures. Caries also occurs on tooth surfaces that are in contact with each other. The border between a tooth and a filling or crown is another area prone to caries, ie, secondary caries. With age, there is a greater risk that the root surfaces become exposed as the gingiva recede. The root surface is more susceptible to acid damage than is tooth enamel, and therefore caries on root surfaces is common in older people.

Who gets caries?

Caries may appear in all people if the balance between the “attack” and the “defense” factors is disturbed for a longer period. This can result from, eg, behavioral changes, since the balance is often maintained when we keep our teeth as free from bacteria as possible, avoid eating sugar too often, and use fluoride. These rather simple rules are not followed by everyone, and are least followed in socially disadvantaged environments. Other factors, eg, disease and/or medication, may also increase the risk for caries.

The occurrence of caries may vary by individual even though behavioral-related factors appear to be similar. These differences may be due to variations in the amount and composition of saliva,

the amount of plaque, the composition of bacteria, and the resistance of tooth enamel. There is still a lack of knowledge in these areas.

Who has caries?

Currently, nearly half of all children and adolescents in Sweden have no visible signs of caries, ie, no fillings or “cavities” in their teeth. However, a large share of them may have initial lesions that can be observed on radiographs of tooth surfaces in contact with each other. Caries develops slowly in most children and adolescents, mainly as a result of fluoride use. In contrast to those children and adolescents who have little or no caries, there is also one group with moderate, and one group with major, sometimes early caries lesions. These children and adolescents are often classified as the high-risk group. The group includes many immigrants and refugees who may have extensive caries as they come from countries where dental care is not prioritized or they have lived under difficult conditions.

Caries is less common today than it was 50 years ago, but it remains a health problem for many children and youth in Sweden. Adults may also have major care needs as a result of caries, particularly those who did not receive preventive care during their youth. Among the group aged 65–84 years in 1996/1997, approximately one fourth were completely toothless. Because an increasing number of people manage keep their teeth at higher ages, and because the average length of life is increasing, the need for both preventive and restorative dental care will increase among adults and the aging population in Sweden.

Although Sweden has had public dental insurance since 1974, dental health is unequally distributed. Studies show that adults in families with low educational level, no cash margin, and immigrant backgrounds have larger problems with chewing and lower dental care utilization. The probability that the children (3–15 years) in these families have, or have had, caries is also higher.

Fluoride

Over 50 years ago it was discovered that a natural level of approximately 1 ppm (1 mg/l) fluoride in drinking water could reduce the occurrence of caries in large population groups. It was claimed that this was due to a systemic effect, ie, that incorporation of fluoride in the enamel lattice during tooth formation and mineralization, made tooth enamel more resistant to acid. Consequently, fluoride was added to drinking water in areas where the natural fluoride level was low. Fluoride was also added to foods such as salt and milk, and children who lived in areas where the fluoride content in drinking water was low received fluoride tablets.

Research in the late 1970s showed that fluoride had primarily a local effect, ie, it worked by being present in the plaque fluid during the caries challenge, slowing down demineralization and promoting remineralization.

Caries prevention

The rate of caries in Sweden was very high in the late 1950s and early 1960s. Treatment consisted of replacing lost tooth substance with fillings, crowns, and bridges, and by extracting teeth that could not be repaired. However, it became increasingly obvious that this was not the way to cure caries.

In the mid to late 1960s, a caries prevention intervention program was initiated, mainly among children and adolescents and within the framework of the public dental service. One of the first interventions was aimed at rinsing the mouth with a fluoride solution every week or every second week during preschool and primary school, initially under the supervision of school teachers.

Child health centers began offering special information sessions for parents on several occasions before the child reached age three years. Dental staff informed patients about toothbrushing, good diet, and the use of fluoride. From the early 1970s, children were called to the public dental service at age three or four years, and the primary teeth were also restored – something that had not been done earlier. Dental nurses received special training to

educate and instruct children and parents about tooth care, to perform professional tooth cleaning, and to give local fluoride treatment. Daily use of fluoride toothpaste was encouraged. The public dental service was heavily engaged in improving dental health, mainly in children and adolescents. During the 1970s, the rate of caries declined markedly in children and adolescents. The improvement of dental health could be noted during most of the 1980s. Today, the decline in caries is no longer as obvious.

Assignment

On assignment from the Swedish Government in 1999, SBU initiated a project to scientifically assess the area of dentistry and oral health. Earlier reports by SBU addressed “Need to assess dental care” and “Smoking and oral health problems”.

An early stage in planning the project involved asking approximately 1 000 dentists to submit proposals concerning areas they believed needed to be scientifically assessed. Caries prevention was among the topics that most dentists viewed as a priority.



A review group was established and began working in December of 1999.

The methods used to prevent caries are the same as those used to treat early caries lesions. Although the methods appear to be simple, major disagreement exists concerning the effects reported in the scientific literature. Also, there are variations in dental health practices. The report systematically and critically reviews the scientific evidence for the effects that the different methods have on caries prevention.

Project methodology

Literature review

The Project Group conducted a systematic review of the methods for caries prevention to determine the state of knowledge in the field. Using different search terms, the Medline database was searched for literature published between 1966 and 2001. The Group searched mainly for studies based on randomized controlled trials (RCT), but due to the low number of such studies, nonrandomized clinical controlled trials (CCT) were also included.

Retrospective studies, studies with follow-up times less than two years for permanent teeth, and studies that did not use caries as an endpoint were excluded from further review. Less stringent requirements were placed on the length of follow-up time in studies of primary teeth, root surfaces, and caries in patients receiving radiotherapy. Using a structured protocol, approximately 900 articles were reviewed in terms of the strength of the evidence and treatment results. The conclusions in this report are based on studies judged as having high-grade or moderate-grade evidence. In formulating the conclusions, findings concerning the effects of the methods evaluated are rated according to the following scale: strong scientific evidence (Grade 1), moderate scientific evidence (Grade 2), limited scientific evidence (Grade 3), or insufficient scientific evidence (Grade 4). In the sections addressing “impaired saliva secretion and caries prevention” and “economic aspects”,

few or no studies of high or moderate scientific evidence could be identified, and therefore the review also includes studies with shorter follow-up times and other study designs.

The conclusions derived from this comprehensive and systematic review are presented in the report. The Project Group placed high standards on the scientific studies used as a basis for the conclusions. Accepting a lower standard of evidence would probably have permitted the Group to formulate more, but less reliable, conclusions.

The report includes several conclusions based on Grade 4 evidence, ie, “insufficient scientific evidence”. “Insufficient” indicates that there are too few studies of high or moderate quality to enable the Project Group to draw reliable conclusions on the preventive effects against caries. It is important to emphasize that Grade 4 does not necessarily indicate that a method has no clinical effects. However, if the scientific documentation shows that a method has no effects, its use should be questioned.

Results

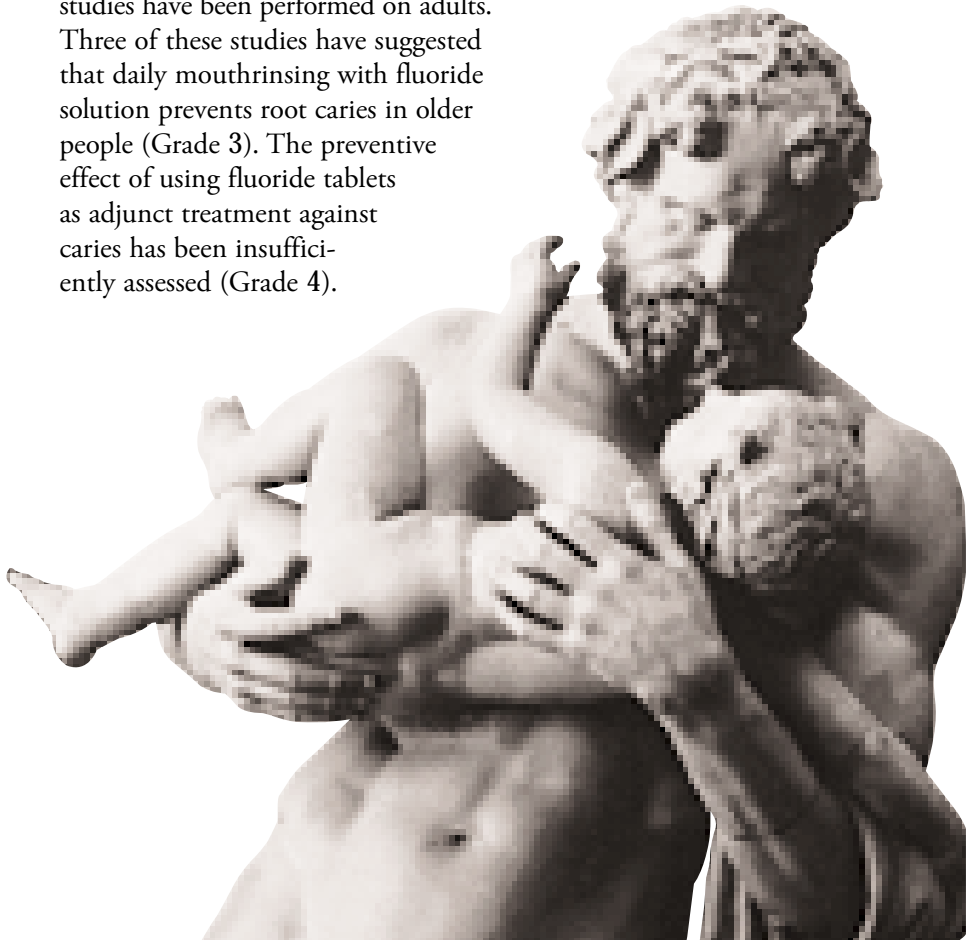
Methods for caries prevention

The methods reviewed included the use of fluoride in different forms and dosages, interventions targeted at diet (eg, using sugar replacement products), methods of removing plaque, fissure sealants and methods to prevent caries when saliva secretion is impaired. The economic and ethical aspects are presented in separate chapters.

Fluoride

The most commonly used product containing fluoride is fluoride toothpaste, which dominates the toothpaste market. The amount of fluoride in toothpaste varies between 250 ppm and 2 500 ppm. In Sweden, the maximum allowed concentration is currently 1 500 ppm. Strong scientific evidence shows that the use of fluoride toothpaste has an effect on the prevention of caries in the permanent

teeth of children and young adults (Grade 1). This effect is dose dependent, ie, toothpaste with higher fluoride concentration, 1 500 ppm fluoride, yields better effect than toothpaste with 1 000 ppm (Grade 1). The effect of fluoride toothpaste on primary teeth has been insufficiently assessed, as have the effects in adults and elderly people. However, nothing suggests that preventive effects would not be found in these age groups. In addition to fluoride toothpaste, other products include fluoride solutions for mouthrinsing and fluoride tablets intended to enhance the effects of fluoride toothpaste in patients with high caries activity or at high risk for caries. The literature offers limited evidence that fluoride mouthrinsing daily, weekly, or once every two weeks has an effect in children and adolescents beyond that achieved by daily use of fluoride toothpaste (Grade 3). Only a few studies have been performed on adults. Three of these studies have suggested that daily mouthrinsing with fluoride solution prevents root caries in older people (Grade 3). The preventive effect of using fluoride tablets as adjunct treatment against caries has been insufficiently assessed (Grade 4).



Varnishes and gels containing fluoride are available for professional use. Gels are also available for self-care at home. Fluoride varnish can be applied on to the teeth. After drying and hardening, the varnish slowly releases fluoride ions. A preventive effect on caries has been shown when treatment is repeated at least twice per year in children and adolescents also with concurrent use of fluoride toothpaste (Grade 3). However, the evidence is insufficient for assessing the preventive caries effects on the primary teeth. The assessments that have been performed on patients with high caries activity do not provide sufficient evidence for drawing reliable conclusions. There are no studies on adults and elderly people.

Regarding fluoride gels, too few studies have been done to reliably assess the preventive effects on caries. In part, this is because treatment with fluoride gel is expensive and mainly occurs in the United States. In Sweden, fluoride gel has been used primarily to treat severely ill patients with high caries activity.

To deliver small doses of fluoride to the saliva several times per day, fluoride can be added to drinking water, table salt, or milk. Fluoride in drinking water is shown to have a preventive effect on caries, but the Swedish National Food Administration regulations do not permit fluoride to be added to drinking water in Sweden. Fluoride in table salt is available in several countries, while fluoride in milk has not been widely used anywhere. The scientific evidence for assessing the effect of fluoride salt or fluoride milk is insufficient to draw conclusions (Grade 4).

Diet and diet-related factors

Sugar is an important substrate for caries-promoting bacteria. Currently, and for the past ten years in Sweden, sugar consumption has exceeded 40 kilos per person and year. Reducing sugar consumption and the frequency of intake would help improve both dental health and health generally. The effects of the dietary information provided by dental staff, mainly to children, adolescents, and parents visiting child health centers and at the regular dental visits, has never been assessed in scientific studies.

Internationally, studies assessing the effects of dietary information are also lacking.

Various sugar substitutes are available on the market. Perhaps the most well known and commonly used are sorbitol and xylitol, sugar alcohols that are mainly used in products such as chewing gum and lozenges. Despite several studies, the evidence is insufficient to determine if they have a preventive effect on caries (Grade 4).

Mechanical and chemical plaque removal, prevention programs

Toothbrushing one or two times per day is an established habit among most people. The scientific literature offers no evidence that toothbrushing alone, without the simultaneous use of fluoride, has a preventive effect against caries. Varying results have been reported in studies of professional tooth cleaning without fluoride. However, when fluoride is administered concurrently, a preventive effect on caries has been shown in children and adolescents (Grade 3).

Chlorhexidine and triclosan are antimicrobial agents that can be added to toothpaste, varnishes, and gels for the purpose of preventing caries. Chlorhexidine is also used in solutions for mouthrinsing. Results have been contradictory in the studies involving chlorhexidine gel. There is no scientific evidence upon which to judge the preventive effects of triclosan on caries (Grade 4). Xylitol, a sugar substitute, can be found as an additive in fluoride toothpaste. However, there is no scientific evidence to show that xylitol yields an effect beyond that of the fluoride which has already been added (Grade 3).

Studies that describe different programs of caries prevention were also reviewed. These programs often include a combination of information about caries disease, instruction in toothbrushing, and regular professional tooth cleaning. Fluoride may also be administered via polishing pastes, gels, mouthrinsing, and fluoride tablets. Most programs that include fluoride in some form show a reduction in caries between 30 percent and 70 percent (Grade 2). It could not be shown that any particular combination of interventions or fluoride agents were more effective than any others.

Fissure sealants

Fissure sealants are used on occlusal surfaces of the teeth. Occlusal surfaces have fissures that make tooth cleaning difficult and allow caries to start. The method involves applying a thin, very fluid, plastic material directly to the fissures. To retain the material to the tooth, its surface is pretreated with an acid that creates small pores in the enamel. The material fills the pores and thereby mechanically bonds to the tooth surface, creating a smooth and even surface. It is essential to keep the tooth absolutely dry during treatment. If not, the pores can fill with saliva and the sealant attaches poorly. Sealants must be applied soon after the tooth emerges to prevent early caries.

Intact sealants have the potential to prevent caries on the occlusal surface. The method is not invasive and causes no pain. However, sealants are technically sensitive, and require continual checking and repair, or replacement if needed. Many studies have been reviewed to determine the preventive effects of fissure sealants composed of resin-based material. Many of the studies are outdated and deficient in study design and follow-up. Hence, there is only limited evidence in the literature that fissure sealants prevent caries in the short and long term (Grade 3). The literature offers insufficient evidence to assess other types of material used as fissure sealants (Grade 4). The scientific documentation also offers insufficient evidence for determining if fissure sealants have a preventive effect against caries in populations with low and high rates of caries (Grade 4).

Impaired saliva secretion and caries prevention

Originally, the objective of this chapter was to review methods for preventing caries in people with various functional impairments, chronic diseases, dementia, etc. The initial search revealed very few clinical controlled studies of caries prevention methods in these patient groups. Several studies, however, could be identified under the heading of “impaired saliva secretion”. Since patients who were included in these studies often had lower saliva secretion due to

radiation therapy, and were severely ill, the inclusion requirements for, eg, follow-up time and for the control groups could not be fulfilled. Consequently, the weight of the evidence in these studies was not assessed, and they were only reviewed and summarized.

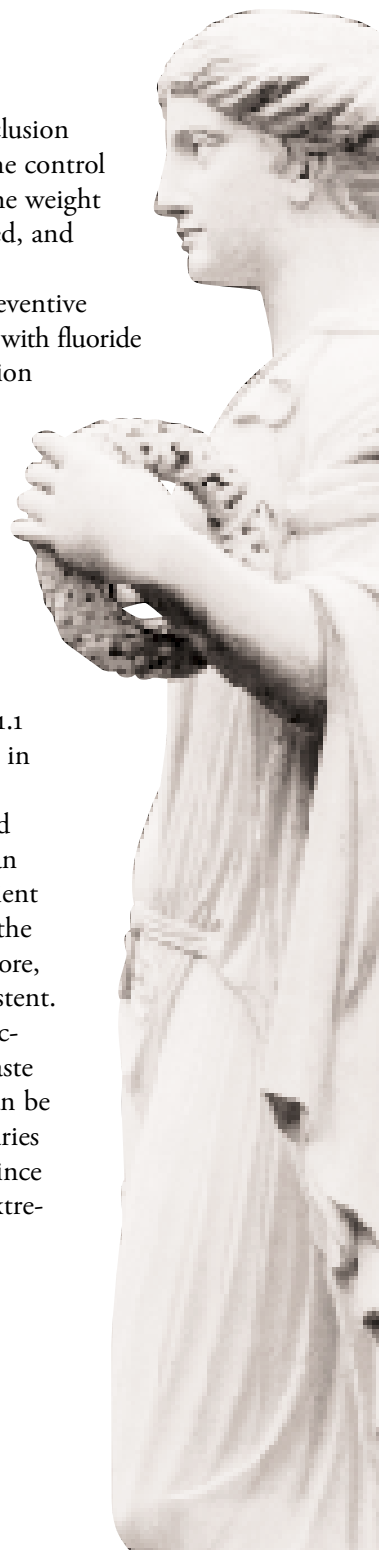
The studies that were assessed showed a preventive effect against caries from treatment using trays with fluoride gel in patients who had been exposed to radiation treatment in the head and neck. The effects were dependent on the level of saliva secretion, ie, the less it had been affected the greater the effects of treatment.

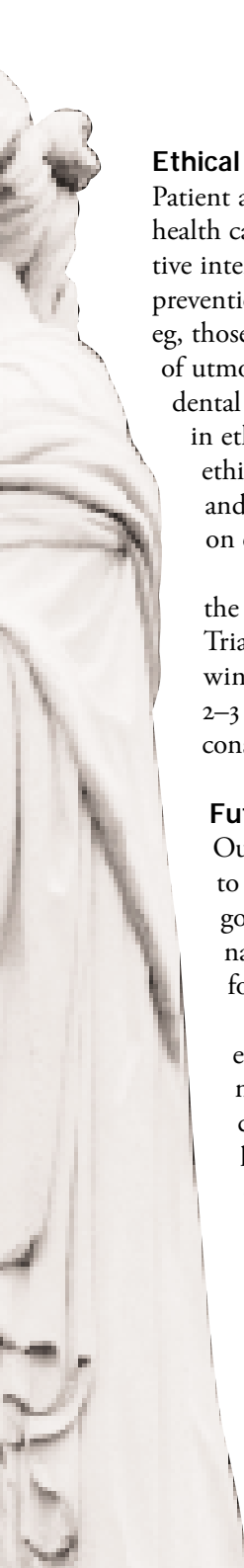
Economic aspects

In Sweden, the total cost to society for dental care in 1998 was approximately 12 billion Swedish kronor (SEK). That year, the cost for caries prevention in adults was approximately 1.1 billion SEK, and the cost for caries prevention in children was approximately 0.2 billion SEK.

Only a few original studies that investigated the effects of caries prevention have included an economic analysis. These studies offer insufficient evidence supporting the economic benefits of the forms of caries prevention reviewed. Furthermore, the evidence in the studies reviewed is inconsistent.

There are no economic studies on cost effectiveness concerning the use of fluoride toothpaste in children and adolescents. Nevertheless, it can be asserted that the most cost-effective form of caries prevention is daily use of fluoride toothpaste since the cost for adding fluoride to toothpaste is extremely low.





Ethical aspects

Patient autonomy is a central and important ethical value in health care. People should not be exposed to treatment or preventive interventions against their will. Regarding decisions on caries prevention that affect individuals with low or limited autonomy, eg, those with psychological function disorders or dementia, it is of utmost importance to respect their integrity. Differences in dental health can, as mentioned earlier, result from differences in ethnic background or socioeconomic conditions. From an ethical perspective, this can be viewed as a breach of justice and does not meet the requirements for good dental health on equal terms as stipulated by the Dental Services Act.

From an ethical standpoint, studies that have assessed the preventive effects of xylitol or sorbitol can be questioned. Trial subjects, often children, have been given sweet chewing gum or other similar product 3–5 times per day for 2–3 years and thereby may have become accustomed to daily consumption of sweets.

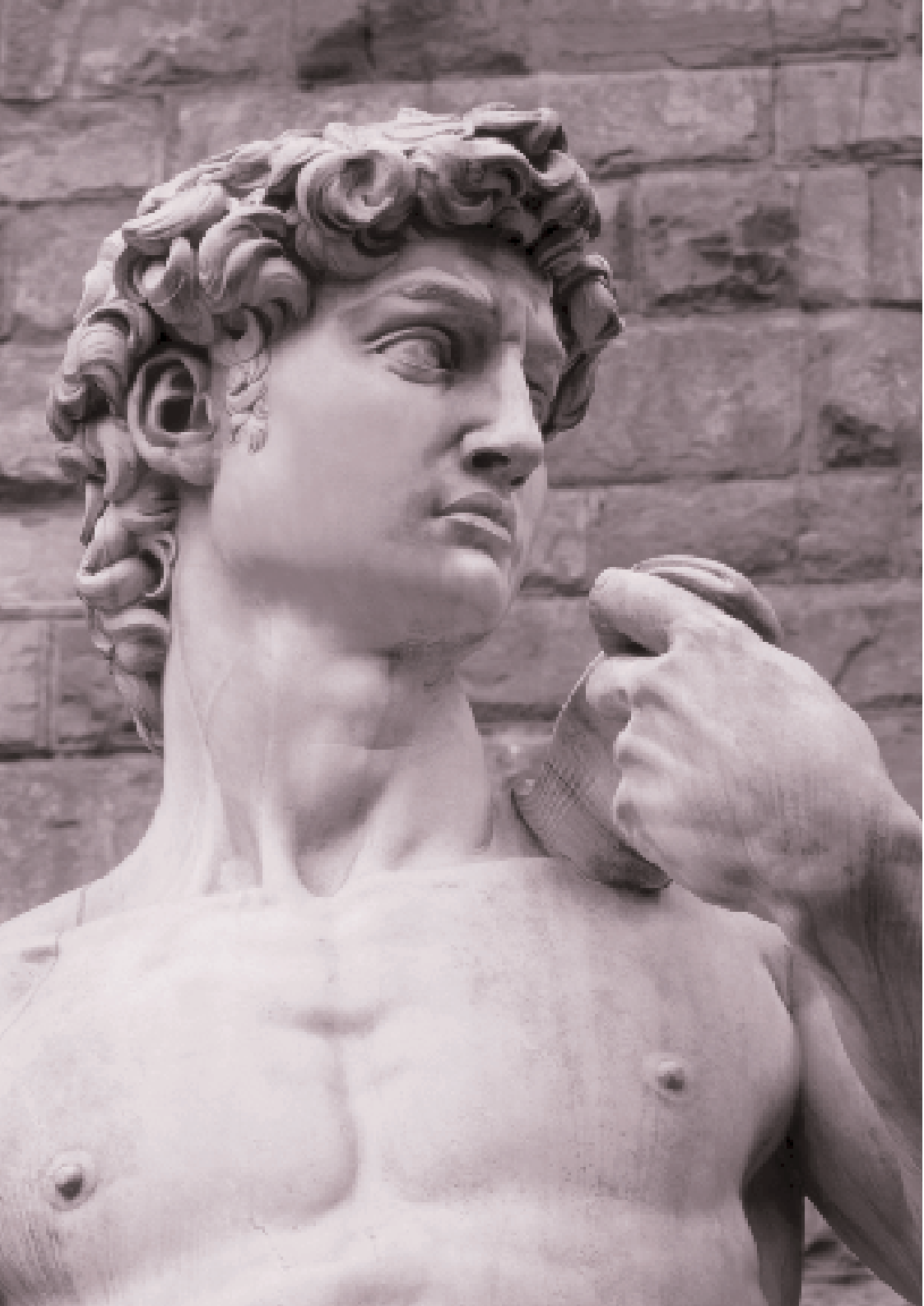
Future research

Our review found documented effects for several interventions to prevent caries, but also a major need for further studies of good quality. The Project Group also identified a need for national epidemiological studies that could serve as a basis for research into caries prevention.

Major deficiencies remain in our knowledge about the effects of local fluoride treatment. The question concerns not only whether fluoride treatment can prevent new caries, but also the effect that treatment has on existing lesions caused by caries. Since the current trend is to delay operative intervention of caries lesions, it is increasingly important to study the effects of different interventions on the caries process. Above all, current evidence is insufficient to determine the effects of treatment on adults and the elderly. Furthermore, surprisingly few studies

have been conducted on patients with high caries activity and on those who are at high risk for caries. It is essential to conduct randomized trials on the effects of fissure sealants in preventing caries. Such trials should be performed under normal clinical conditions within the framework of dental health services for children and adolescents. Studies in young adults on teeth sealed earlier, would provide knowledge on whether sealants have any preventive effects on caries in the long term. Studies are lacking in populations with high caries activity.

An increasing number of people keep their own teeth until they reach higher ages. Since the average life expectancy is increasing in Sweden, the adult and aging population will have an increasing need for both preventive and reparative dental care. Older patients may need special attention in programs to prevent caries. Diseases and medications that lead to mouth dryness are common and increase the risk for caries, mainly in exposed root surfaces and at the borders of previous fillings. Many elderly people find it difficult to adequately manage their own oral hygiene. Preventive interventions for patients with chronic diseases and various functional impairments need programs that are designed and evaluated according to the special problems associated with the disease. Current evidence is insufficient to draw any conclusions concerning how prevention of caries should be designed for this group. This is an important area for future research. It is essential to include economic analyses in studies that assess preventive interventions against caries. This review did not identify any such study as having moderate- or high-grade evidence. In the absence of such studies, the health economics of efforts to prevent caries cannot be assessed.



Conclusions

- ❑ Caries remains a major public health problem. Extensive damage from caries can lead to major problems for the individual, affecting quality of life both functionally and esthetically. Good general health also includes good oral health. Hence, preventing caries is an important element in public health efforts.
- ❑ Daily use of toothpaste with fluoride is an effective method of preventing caries in permanent teeth of children and adolescents (Grade 1). The effects are dose-related, ie, toothpaste with a higher concentration of fluoride, 1 500 ppm, yields a better effect than toothpaste with 1 000 ppm (Grade 1). The scientific literature does not evaluate the preventive effects of fluoride toothpaste on primary teeth or in adult and elderly individuals (Grade 4). However, nothing would suggest that preventive effects would not be found in these age groups as well.
- ❑ Fluoride mouthrinsing daily, every week or every 14 days, can reduce the incidence of caries in children and adolescents, but adds no further protection to the daily use of fluoride toothpaste (Grade 3).
- ❑ Daily fluoride mouthrinsing is shown to have a preventive effect on root caries in elderly people (Grade 3).
- ❑ Professional treatment using fluoride varnish at least twice annually has preventive effects on caries in young permanent teeth, even with concurrent use of fluoride toothpaste (Grade 3). There is no scientific evidence to assess the effects on primary teeth or in adults (Grade 4).

- ❑ The preventive effects of fluoride tablets on primary teeth or permanent teeth cannot be scientifically assessed, nor can the preventive effects of adding fluoride to milk or salt (Grade 4).
- ❑ The effect of information given to reduce sugar in the diet and aimed at preventing caries is insufficiently assessed. The scientific documentation is insufficient for determining whether sugar substitutes (sorbitol and xylitol) in chewing gum and sweets have any preventive effects on caries (Grade 4).
- ❑ Prevention programs involving fluoride have a preventive effect on caries in children and adolescents (Grade 2). There are no studies on adults, but there is no reason to assume that this principle would not apply to all age groups. Antibacterial additives to toothpaste, such as chlorhexidine and triclosan, have no confirmed preventive effects on caries. Likewise, adding xylitol to fluoride toothpaste does not yield additional effects beyond the effect of fluoride (Grade 3).
- ❑ The use of fissure sealants performed with resin-based material has a preventive effect on caries (Grade 3).
- ❑ Scientific documentation is insufficient to draw any conclusions concerning how the work to prevent caries should be organized for groups with special needs, eg, elderly patients, patients with chronic disease and patients at high risk for caries or with high caries activity (Grade 4).
- ❑ There are no studies with sufficiently high-grade evidence to assess the economic effects of interventions to prevent caries.

Effects of interventions to prevent caries – overview

Intervention	Effect	Grade	Comments	Chapter
Fluoride toothpaste	+	1	Permanent teeth, children and adolescents, daily use	3.1
Fluoride rinsing	+	3	No additional effect during concurrent use of fluoride toothpaste and low caries rate	3.2
Fluoride rinsing for root caries	+	3	Individuals over 60 years of age	3.2
Fluoride topical application	+	3	Permanent teeth Twice per year	3.2
Fluoride varnish	+	3	Permanent teeth Children and adolescents, at least twice per year	3.3
Fluoride gel	+	3	Acidified APF gel	3.4
Fluoride tablets	?	4	Lozenges	3.5
Fluoride in drinking water	+	3	Not used in Sweden Assessed by NHS	3.6
Fluoride in milk	?	4	Not used in Sweden	3.6
Fluoride in salt	?	4	Not used in Sweden	3.6
Dietary information	?	4	No studies	4
Sorbitol in sweets and chewing gum	?	4	Insufficient documentation	4
Xylitol in sweets and chewing gum	?	4	Insufficient documentation	4

Intervention	Effect	Grade	Comments	Chapter
Dental floss use	?	4	Contradictory results	5
Prevention program for caries active	?	4	Insufficient documentation	5
Prevention program using fluoride	+	2	No difference between different combinations of interventions	5
Tooth cleaning, professional	?	4	Without fluoride	5
Tooth cleaning, professional	+	3	With concurrent use of fluoride	5
Triclosan in toothpaste	?	4	No studies	5
Xylitol in toothpaste	0	3	Concurrent fluoride additives	5
Fissure sealants	+	3	Resin-based material	6
Fissure sealants	?	4	Glass ionomer cements	6

+ = favorable effect

o = no demonstrated favorable effect

? = uncertain effect

The evidence for each method was graded as follows:

1 = strong scientific support

2 = moderate scientific support

3 = limited scientific support

4 = insufficient scientific support

NHS = National Health Services, Great Britain

Reports *published by SBU*

Swedish Yellow Reports

Prevention of Dental Caries (2002), no 161

Prevention, Diagnosis, and Treatment of Venous Thromboembolism (2002), three volumes, no 158/1+2+3

Obesity – Problems and Interventions (2002), no 160

Hormone Replacement Therapy (2002), no 159

Treatment of Alcohol and Drug Abuse – An Evidence-Based Review (2001), two volumes, no 156/1+2

Chemotherapy for Cancer (2001), two volumes, no 155/1+2

Mild Head Injury (2000), no 153

Treating Asthma and COPD (2000), no 151

Stomach Pain – Evidence-Based Methods in the Diagnosis and Treatment of Dyspepsia (2000), no 150

Advanced Home Health Care and Home Rehabilitation – Reviewing the Scientific Evidence on Costs and Effects (1999), no 146

Back and Neck Pain (2000), two volumes, no 145/1+2

Evidence Based Treatment of Urinary Incontinence (2000), no 143

Prognostic Methods in Acute Coronary Artery Disease (1999), no 142

Routine ultrasound examination during pregnancy (1998), no 139

Smoking cessation methods (1998), no 138

Surgical treatment of rheumatic diseases (1998), two volumes, no 136/1+2

Preventing disease with antioxidants (1997), three volumes, no 135/1+2+2:2

Community intervention programs to prevent cardiovascular disease – A systematic review of the literature (1997), no 134

Treatment with neuroleptics (1997) two volumes, no 133/1+2

Hormone replacement therapy (1996), no 131

Radiotherapy for cancer (1996), no 129/1

Critical Issues in Radiotherapy (1996), no 129/2

Bone density measurement (1995), no 127

Mass screening for prostate cancer (1996), no 126

The treatment and rehabilitation of traffic accident victims (1994), no 122

Moderately elevated blood pressure (1994), no 121

Genetic diagnosis by PCR (1993), no 118

Diabetic retinopathy - the value of early detection (1993), no 117

Stroke (1992), no 116

MRI – magnetic resonance imaging (1992), no 114

Surgery for epilepsy (1991), no 110

Bone marrow transplantation (1989), no 109

Back pain – causes, diagnosis, treatment (1991), no 108

The problem of back pain – proceedings from a Conference (1989), no 107

Lithotripsy for Kidney Stones and Gallstones, no 106

Vascular Surgery for Arteriosclerosis in the Legs, no 105

Gastroscopy in the diagnosis of dyspepsia (1990), no 104

Preoperative routines (1989), no 101

Swedish White Reports

Smoking and Oral Health Problems (2002), no 157

Need to Assess Dental Care (2000), no 152

Sweden and Swedish Health Services – Economic Outlook III, Conference Report (2000), no 149

Alert – New Methods in Health Care – Early assessment of costs and benefits (2000), no 148

Children Born From In Vitro Fertilization (IVF) (2000), no 147

Placebo (2000), no 154

The Patient-Doctor Relationship and the Art of Medicine: An Evidence-Based Review (2000), no 144

Evidence-Based Physiotherapy for Patients with Neck Pain (1999), no 102

Evidence-Based Physiotherapy for Patients with Low-Back Pain (1999), no 101

Evidence-Based Nursing – Treatment of people with schizophrenia (2000), no 4

Evidence-Based Nursing in Treatment of People with Depression (1999), no 3

Evidence Based Nursing: Patients With Moderate Hypertension (1998), no 2

Evidence-Based Nursing Report 1 Radiotherapy for patients with cancer (1998), no 1

Chest Pain: Surgery, Balloon Dilation, Drugs (1998), no 140

Sweden and Swedish Health Services – Economic Outlook II, Conference Report (1998), no 137

Longer life and better health – A report on prevention (1997), no 132

Sweden and Swedish Health Services – Economic Outlook I, Conference Report (1995), no 128

Healthcare Trends in Sweden, 1960–1992 (1995), no 124

Need for Assessment in Nursing (1994), no 123

Need for Assessment in Psychiatry (1992), no 112

Alert Reports

Early assessments of new methods in health care.
Find them at www.sbu.se in pdf-format under Alert.

English Reports

Evidence Based Nursing: Caring for Persons with Schizophrenia (1999/2001), no 4c

Chemotherapy for Cancer (2001), no 155/2

CABG/PTCA or Medical Therapy in Anginal Pain (1998) no 141c

Bone Density Measurement, Journal of Internal Medicine,
Volume 241 Suppl 739 (1997), 127/suppl

Mass Screening for Prostate Cancer, International Journal of Cancer,
Suppl 9 (1996), 126/suppl

Radiotherapy for Cancer, Volume 1, Acta Oncologica, Suppl 6 (1996), 129/1/suppl

Radiotherapy for Cancer, Volume 2, Acta Oncologica, Suppl 7 (1996), 129/2/suppl

Critical Issues in Radiotherapy (1996), no 130e

Hysterectomy – Ratings of Appropriateness... (1995), no 125e

Moderately Elevated Blood Pressure, Journal of Internal Medicine, Volume 238
Suppl 737 (1995), 121/suppl

CABG and PTCA. A Literature Review and Ratings... (1994), no 120e

Literature Searching and Evidence Interpretation (1993), no 119e

Stroke (1992), no 116e

The Role of PTCA (1992), no 115e

Prioritizing and rationing in health care - actual trends in the USA.
Report from a conference. (1991), no 111e

The Problem of Back Pain – Conference Report (1989), no 107c

Preoperative Routines (1989), no 101c

To order SBU Reports

*The reports listed above can be ordered via the Internet at www.sbu.se,
by phone (+46 8 412 32 00), or by fax (+46 8 411 32 60).*

SBU Evaluates Health Care Technology

The Swedish Government has given SBU the following responsibilities:

- SBU shall evaluate the methods used in health care by systematically and critically reviewing the scientific evidence in the field.
- SBU's assessments shall cover the medical aspects and the ethical, social, and economic consequences of disseminating and applying medical and dental technologies.
- SBU's assessments shall be compiled, presented, and disseminated in such a way that all affected parties have access to the information.
- SBU shall contribute, through informational and educational initiatives, toward ensuring that the knowledge gained is used to rationally utilize available resources in health care.
- SBU shall draw on national and international experience and research findings in the field and shall serve as a focal point for health technology assessment in Sweden. This effort shall be managed in a way that secures success and respect for the organization, both domestically and internationally.

Prevention of Dental Caries

SBU's task is to critically review the scientific basis of methods used in health care and to evaluate their costs, risks, and benefits. This is a summary of the SBU report "Prevention of Dental Caries".