BDA LIBRARY MEDLINE SEARCH

RECENT REVIEWS RELATED TO DENTAL CARIES

Database: Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily, Ovid MEDLINE and Versions(R)

Search Strategy:
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1  exp *Dental Caries/ (31774)
2  (caries or carious).ti. (24224)
3  1 or 2 (35791)
4  limit 3 to english language (25702)
5  review.ti. and 4 (574)
6  limit 4 to "review articles" (2071)
7  limit 4 to systematic reviews (726)
8  5 or 6 or 7 (2469)
9  limit 8 to yr="2017 -Current" (96)
10 remove duplicates from 9 (92)

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Unique Identifier
29073814

Authors
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Title
Selective versus non-selective removal for dental caries: a systematic review and meta-analysis.

Source

Abstract
OBJECTIVE: Selective and non-selective methods for caries removal were controversial so far, thus we aimed to compare the efficacy of selective and non-selective caries removal by conducting meta-analysis of randomized controlled trials (RCTs).

MATERIALS AND METHODS: Eligible RCTs studies comparing selective caries removal with non-selective caries removal were retrieved by searching PubMed, EMBASE and Cochrane Library till 15 July 2017. The pooled odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for outcome indicators, including pulpal exposure, pulpal symptoms and failure using Inverse variance-random effects or Mantel-Haenszel-fixed effects models.

RESULTS: Totally, seven studies were eligible for the meta-analysis. Compared with the non-selective caries removal group, the risk of pulpal exposure was significantly reduced in the selective caries removal group (OR=0.11, 95% CI: 0.04-0.30). No significant difference was observed in pulpal symptoms (OR=0.79, 95% CI: 0.30-2.12) and failure (OR=1.40, 95% CI: 0.69-2.84) between the groups.

CONCLUSIONS: The efficacy of selective caries removal appears comparable to that of non-selective caries removal in children, with similar pulpal symptoms and failure, but selective caries removal may result in a low incidence of pulpal exposure. However, larger-scale RCTs with long-term follow-up are required to confirm this conclusion.
RECENT REVIEWS RELATED TO DENTAL CARIES

Sroussi, Herve Y; Epstein, Joel B; Bensadoun, Rene-Jean; Saunders, Deborah P; Lalla, Rajesh V; Migliorati, Cesar A; Heaivilin, Natalie; Zumsteg, Zachary S.

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Title
Common oral complications of head and neck cancer radiation therapy: mucositis, infections, saliva change, fibrosis, sensory dysfunctions, dental caries, periodontal disease, and osteoradionecrosis. [Review]

Source

Abstract
Patients undergoing radiation therapy for the head and neck are susceptible to a significant and often abrupt deterioration in their oral health. The oral morbidities of radiation therapy include but are not limited to an increased susceptibility to dental caries and periodontal disease. They also include profound and often permanent functional and sensory changes involving the oral soft tissue. These changes range from oral mucositis experienced during and soon after treatment, mucosal opportunistic infections, neurosensory disorders, and tissue fibrosis. Many of the oral soft tissue changes following radiation therapy are difficult challenges to the patients and their caregivers and require life-long strategies to alleviate their deleterious effect on basic life functions and on the quality of life. We discuss the presentation, prognosis, and management strategies of the dental structure and oral soft tissue morbidities resulting from the administration of therapeutic radiation in head and neck patient. A case for a collaborative and integrated multidisciplinary approach to the management of these patients is made, with specific recommendation to include knowledgeable and experienced oral health care professionals in the treatment team.

BACKGROUND: Dental caries (tooth decay) is one of the most common chronic childhood diseases. Caries prevalence in most industrialised countries has declined among children over the past few decades. The probable reasons for the decline are the widespread use of fluoride toothpaste, followed by artificial water fluoridation, oral health education and a slight decrease in sugar consumption overall. However, in regions without water fluoridation, fluoride supplementation for pregnant women may be an effective way to increase fluoride intake during pregnancy. If fluoride supplements taken by pregnant women improve neonatal outcomes, pregnant women with no access to a fluoridated drinking water supply can obtain the benefits of systemic fluoridation.

OBJECTIVES: To evaluate the effects of women taking fluoride supplements (tablets, drops, lozenges or chewing gum) in pregnant women for preventing dental caries in the primary teeth of their children. [Review]

Source
Cochrane Database of Systematic Reviews. 10:CD011850, 2017 Oct 23.

Abstract
BACKGROUND: Dental caries (tooth decay) is one of the most common chronic childhood diseases. Caries prevalence in most industrialised countries has declined among children over the past few decades. The probable reasons for the decline are the widespread use of fluoride toothpaste, followed by artificial water fluoridation, oral health education and a slight decrease in sugar consumption overall. However, in regions without water fluoridation, fluoride supplementation for pregnant women may be an effective way to increase fluoride intake during pregnancy. If fluoride supplements taken by pregnant women improve neonatal outcomes, pregnant women with no access to a fluoridated drinking water supply can obtain the benefits of systemic fluoridation.

SEARCH METHODS: Cochrane Oral Health’s Information Specialist searched the following databases: Cochrane Oral Health’s Trials Register (to 25 January 2017); the Cochrane Central Register of Controlled Trials (CENTRAL; 2016, Issue 11) in the Cochrane Library (searched 25 January 2017); MEDLINE (Ovid from 1946 to 25 January 2017); Embase Ovid (1980 to 25 January 2017); LILACS BIREME Virtual Health Library (Latin American and Caribbean Health Science Information database; 1982 to 25 January 2017); and CINAHL EBSCO (Cumulative Index to Nursing and Allied Health Literature; 1937 to 25 January 2017). We searched the US National Institutes of Health Ongoing Trials Register (ClinicalTrials.gov) and the World Health Organization
International Clinical Trials Registry Platform for ongoing trials to 25 January 2017. No restrictions were placed on the language or date of publication when searching the electronic databases.

**SELECTION CRITERIA:** Randomised controlled trials (RCTs) of fluoride supplements (tablets, drops, lozenges or chewing gum) administered to women during pregnancy with the aim of preventing caries in the primary teeth of their children.

**DATA COLLECTION AND ANALYSIS:** Two review authors independently screened the titles and abstracts (when available) of all reports identified through electronic searches. Two review authors independently extracted data and assessed risk of bias, as well as evaluating overall quality of the evidence utilising the GRADE approach. We could not conduct data synthesis as only one study was included in the analysis.

**MAIN RESULTS:** Only one RCT met the inclusion criteria for this review. This RCT showed no statistical difference on decayed or filled primary tooth surfaces (dfs) and the percentage of children with caries at 3 years (risk ratio (RR) 1.46, 95% confidence interval (CI) 0.75 to 2.85; participants = 938, very low quality of evidence) and 5 years old (RR 0.84, 95% CI 0.53 to 1.33; participants = 798, very low quality of evidence). The incidence of fluorosis at 5 years was similar between the group taking fluoride supplements (tablets) during the last 6 months of pregnancy and the placebo group.

**AUTHORS’ CONCLUSIONS:** There is no evidence that fluoride supplements taken by women during pregnancy are effective in preventing dental caries in their offspring.

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**Title**
Status and progress of treatment methods for root caries in the last decade: a literature review. [Review]
Source

**Abstract**
The aim of this literature review is to explore the treatment methods for root caries in laboratory and clinical research in the last decade. A systematic search of publications in PubMed and Web of Science databases was performed. The timespan was limited to the last 10 years and English language. Further retrieval was conducted using the search terms of specific therapies or treatments. Eighty-two articles were included in this systematic review and full texts were retrieved. Types of studies included laboratory studies and clinical trials. Therapeutic approaches for root caries without risk of pulp exposure can be categorized into non-invasive and restorative treatment. Non-invasive treatments which targeted different causative factors of root caries have been developed in the last decade. Accordingly, several artificial caries model systems have been proposed for the study of root caries in the laboratory. Carious tissue excavation techniques and restorative materials and procedures have been modified to improve the prognosis of invasive treatment. It is of importance to determine the most appropriate therapy for root caries and further clinical trials are needed to draw firm conclusions concerning the efficacy and consistency of the various treatment methods proposed.

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**Title**
Status and progress of treatment methods for root caries in their offspring
Source

**Abstract**
The aim of this literature review is to explore the treatment methods for root caries in laboratory and clinical research in the last decade. A systematic search of publications in PubMed and Web of Science databases was performed. The timespan was limited to the last 10 years and English language. Further retrieval was conducted using the search terms of specific therapies or treatments. Eighty-two articles were included in this systematic review and full texts were retrieved. Types of studies included laboratory studies and clinical trials. Therapeutic approaches for root caries without risk of pulp exposure can be categorized into non-invasive and restorative treatment. Non-invasive treatments which targeted different causative factors of root caries have been developed in the last decade. Accordingly, several artificial caries model systems have been proposed for the study of root caries in the laboratory. Carious tissue excavation techniques and restorative materials and procedures have been modified to improve the prognosis of invasive treatment. It is of importance to determine the most appropriate therapy for root caries and further clinical trials are needed to draw firm conclusions concerning the efficacy and consistency of the various treatment methods proposed.
**Recent Reviews Related to Dental Caries**

**Title**
Sugars and beyond. The role of sugars and the other nutrients and their potential impact on caries. [Review]

**Source**
Oral Diseases., 2017 Sep 12.

**Abstract**
The traditional concept of caries as a multifactorial transmittable and infectious disease has been challenged. Novel conceptual ideas have come to add to the complexity of this highly prevalent disease worldwide. Current etiological understanding of the disease has emphasized the pivotal role of sugars in caries. In fact, current definition points toward an ecological disease caused by the commensal microbiota that under ecological imbalances, mainly due to high and or frequent sugars consumption, creates a state of dysbiosis in the dental biofilm. This modern conceptual idea, however, tends to underrate a key issue. As humans are omnivore and consume a mix diet composed by a multitude of substances, the role of the diet in caries must not be restricted only to the presence of fermentable sugars. This review explores the contribution of other food components, ubiquitous to the diet, mostly as potentially protective factors. Anticaries nutrients might determine an environmental change, affecting the ecology of the oral microbiome and partially mitigating the effect of sugars. Understanding the function of the food usually consumed by the people will contribute new knowledge on the mechanisms associated with the onset of caries, on new caries risk variables and on potential novel strategies for the prevention and treatment of the disease.
Fluoride mouthrinses for preventing dental caries in children and adolescents. [Review]


Abstract

The Mission of the Cochrane Nursing Care Field (CNCF) is to improve health outcomes through increasing the use of the Cochrane Library and supporting Cochrane's role by providing an evidence base for nurses and related health care professionals involved in delivering, leading, or researching nursing care. The CNCF produces "Cochrane Corner" columns (summaries of recent nursing-care-relevant Cochrane Reviews) that are regularly published in collaborating nursing-care-related journals. Information on the processes this Field has developed can be accessed at: http://cncf.cochrane.org/evidence-transfer-program-reviewsummaries.

A systematic review of the effects of supervised toothbrushing on caries incidence in children and adolescents. [Review]


Abstract

BACKGROUND: The anticaries effect of supervised toothbrushing, irrespective of the effect of fluoride toothpaste, has not been clearly determined yet.

AIM: To assess the effects of supervised toothbrushing on caries incidence in children and adolescents.
DESIGN: A systematic review of controlled trials was performed (CRD42014013879). Electronic and hand searches retrieved 2046 records, 112 of which were read in full and independently assessed by two reviewers, who collected data regarding characteristics of participants, interventions, outcomes, length of follow-up and risk of bias.

RESULTS: Four trials were included and none of them had low risk of bias. They were all carried out in schools, but there was great variation regarding children's age, fluoride content of the toothpaste, baseline caries levels and the way caries incidence was reported. Among the four trials, two found statistically significant differences favouring supervised toothbrushing, but information about the magnitude and/or the precision of the effect estimate was lacking and in one trial clustering effect was not taken into consideration. No meta-analysis was performed due to the clinical heterogeneity among the included studies and differences in the reporting of data.

CONCLUSIONS: There is no conclusive evidence regarding the effectiveness of supervised toothbrushing on caries incidence.
OBJECTIVES: The objective of this study was to evaluate the effectiveness of oral health educational actions in the school context in improving oral hygiene and dental caries in schoolchildren through systematic review and meta-analysis.

METHODS: Clinical trials with schoolchildren between 5 and 18 years old were included. Eligible studies were those which had as outcomes caries, plaque accumulation, gingivitis, toothache or tooth loss and which had been published from 1995 to 2015, in any language. The risk of bias was assessed in specific domains according to the Cochrane Handbook. A meta-analysis was carried out using fixed-effects models.

RESULTS: A total of 4417 references were found, from which 93 full texts were evaluated and 12 included in this meta-analysis. Five studies showed a reduction in plaque levels, and two studies with gingivitis as the outcome found no effect. There was not enough evidence on the effectiveness of the interventions in reducing dental caries.

CONCLUSIONS: Traditional oral health educational actions were effective in reducing plaque, but not gingivitis. There is no long-term evidence in respect of the effectiveness of these interventions in preventing plaque accumulation, gingivitis and dental caries in the school environment.
OBJECTIVES: The total body of evidence finds fluoride varnish effective to prevent caries. However, most trials were conducted in high-risk populations, with more recent trials on low-risk groups finding a lower efficacy. We aimed to assess the cost-effectiveness of fluoride varnish application in clinic setting in populations with different caries risk.

METHODS: A mixed public-private-payer perspective in the context of German health care was performed using a lifetime Markov model. Effectiveness data were derived from an update of the most recent systematic Cochrane review and synthesized in three different risk groups according to control group caries increment via random-effects meta-analysis. Varnish was assumed to be applied twice yearly between age 6 and 18 years. Teeth with carious defects would be treated restoratively and could experience further follow-up treatments. Costs were deduced from German fee item catalogues. Monte Carlo microsimulations were used for to analyse lifetime treatment costs and caries increment (Euro/Decayed, Missing, Filled Teeth (DMFT)).

RESULTS: In low-risk groups, fluoride varnish was nearly twice as costly and minimally more effective (293 Euro, 8.1 DMFT) than no varnish (163 Euro, 8.5 DMFT). The incremental cost-effectiveness ratio (ICER) was 343 Euro spent per avoided DMFT. The ICER was lower in medium-risk (ICER 93 Euro/DMFT) and high-risk groups (8 Euro/DMFT).

CONCLUSIONS: Application of fluoride varnish in the clinic setting is unlikely to be cost-effective in low-risk populations. There is the need to either target high-risk groups or to provide fluoride varnish at lower costs, possibly in nonclinic settings.

Abstract

Comparator choice has been found one major factor impacting on the overall evidence supporting clinical interventions. We performed social network analysis on trials on the prevention/management of caries/carious lesions, hypothesizing that certain comparators are proportionally over-investigated, and others under-investigated, and that comparisons within comparator classes are preferred over comparisons between classes. A systematic review of randomized controlled trials on the prevention/management of caries/existing carious lesions was carried out. All comparators were classified at each of three levels of granularity, becoming more detailed with each level; (a) degree of invasiveness (non-, micro- or invasive), (b) the specific non-invasive, micro-invasive or invasive approach, (c) the actual material or technique used. Social network analysis was used to evaluate trial networks. Searching electronic databases found 4,774 articles of which 765 were relevant and 605 were included. The networks for all levels were polygonal. There was a high degree of separation of comparisons in prevention versus management trials. Invasive comparators were tested most frequently (number of comparators: 611), mainly in management trials. Non-invasive comparators were tested next often (474), mainly in caries prevention. Micro-invasive strategies were tested next often (233), in both, prevention and management trials. On more granular levels, few interventions dominated the networks. Regardless of the level, the majority of trials compared within, not between classes. Prevention trials were mainly conducted in children (number of trials in adults/children/both: 37/241/1), while those on managing lesions were conducted in both children and adults (117/179/21). Comparator choice in cariology trials is driven by indication, and limits conclusions on the true comparative effectiveness of all strategies. There are a variety of comparators that have not been, but should be, compared to one another, which should be addressed by future trials. Factors underlying trialists’ comparator choice need to be identified.
Mechanisms of silver diamine fluoride on arresting caries: a literature review. [Review]

OBJECTIVE: To review the evidence regarding the mechanisms of silver diamine fluoride (SDF) for arresting caries.

METHODS: A literature search was conducted using the keywords silver diamine fluoride, and its alternative names, in seven databases: PubMed, Embase and Scopus (English); China National Knowledge Infrastructure (Chinese); Biliboteca Virtual em Saude (Portuguese); Biblioteca Virtual en Salud Espana (Spanish); and Ichushi-Web (Japanese). The titles and abstracts were screened. Full texts were retrieved for publications that studied mechanisms of actions of SDF, including its effects on remineralisation of carious lesions and on cariogenic bacteria.

RESULTS: A total of 1,123 publications were identified. Twenty-nine articles were included and they investigated the effect of SDF on cariogenic bacteria and dental hard tissues. Eleven studies investigated the antibacterial properties of SDF. They found that SDF was bactericidal to cariogenic bacteria, mainly Streptococcus mutans. It inhibited the growth of cariogenic biofilms on teeth. Twenty studies reported the remineralisation of demineralised enamel or dentine by SDF. They found that mineral loss of demineralised enamel and dentine was reduced after SDF treatment. A highly mineralised surface rich in calcium and phosphate was formed on arrested carious lesions. Four studies examined the effect of SDF on dentine collagen. They found that SDF inhibited collagenases (matrix metalloproteinases and cysteine cathepsins) and protected dentine collagen from destruction.

CONCLUSION: SDF is a bactericidal agent and reduces the growth of cariogenic bacteria. It inhibits remineralisation and promotes the remineralisation of demineralised enamel and dentine. It also hampers degradation of the dentine collagen.

Early childhood caries: a review.

OBJECTIVE: To review the evidence regarding the mechanisms of silver diamine fluoride (SDF) for arresting caries.

METHODS: A literature search was conducted using the keywords silver diamine fluoride, and its alternative names, in seven databases: PubMed, Embase and Scopus (English); China National Knowledge Infrastructure (Chinese); Biliboteca Virtual em Saude (Portuguese); Biblioteca Virtual en Salud Espana (Spanish); and Ichushi-Web (Japanese). The titles and abstracts were screened. Full texts were retrieved for publications that studied mechanisms of actions of SDF, including its effects on remineralisation of carious lesions and on cariogenic bacteria.

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CONCLUSION: SDF is a bactericidal agent and reduces the growth of cariogenic bacteria. It inhibits remineralisation and promotes the remineralisation of demineralised enamel and dentine. It also hampers degradation of the dentine collagen.
BDA LIBRARY MEDLINE SEARCH

RECENT REVIEWS RELATED TO DENTAL CARIES

Abstract
Early childhood tooth problems are associated with variations in intrauterine and postnatal growth. Both premature and delayed timing of this physiological process might be a manifestation of local and/or systemic alterations. Presently, most clinicians agree that teething does not seriously cause life taking pathological state, however, they disagree about reasons responsible for tooth eruption. The distinctive clinical presentation of dental caries in infants and toddlers, which is often known as early childhood caries (ECC), and are influenced by the eruption sequence of the primary dentition. Partial evidence exists in the context of ECC development, pathways, and disease rates in infants and toddlers. The present review article is focused on the current views of ECC.

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Title
Assocation between prenatal maternal cigarette smoking and early childhood caries. A systematic review. [Review]

Source

Abstract
BACKGROUND: The aim of the present study was to assess the relationship between prenatal maternal cigarette smoking (PMCS) and early childhood caries (ECC) through a systematic review of currently available scientific evidence.

MATERIAL AND METHODS: To address the focused question: "Is there an association between PMCS and ECC?" an electronic literature search without time or language restrictions was conducted till May 2017 in indexed databases using various key words including dental caries, pregnancy, smoking, tobacco products and child. Letters to the editor, commentaries, reviews, case reports and case series and studies in which, ECC was investigated without clinical dental examination, were excluded.

RESULTS: Eight observational cross-sectional studies were included. The number of participants ranged between 1102 and 76920 children with age ranging between 24 months and 72 months. Seven studies reported a positive association between PMCS and ECC. One study reported that children whose mother smoked at least five cigarettes/day during pregnancy presented a higher caries severity level compared with those whose mothers did not smoke. One study showed no association between ECC and PMCS.

CONCLUSIONS: The association between PMCS and ECC remains debatable. Further well-designed longitudinal studies are needed in this regard.

Key words: Cigarette, early childhood caries, pregnancy, risk factors, smoking.

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Title
Little evidence available for arginine and caries prevention.
Source: Evidence-Based Dentistry. 18(3):71, 2017 Oct 27.

Abstract

Data sources: PubMed, the Cochrane Library, Centre for Reviews and Dissemination (CRD) and Embase. Data abstraction and synthesis: Two independent reviewers selected studies, abstracted data and assessed study quality using the GRADE criteria. Meta-analysis was conducted using a random effects model. Study selection: Randomised controlled trials including in situ studies.

Results: Seven studies were included, five conducted in children and two in adults. The two adult studies and one child study were considered to be at high risk of bias. The remaining four child studies were considered to be at moderate risk of bias. These four studies compared 1450ppm fluoride toothpaste with 1.5% arginine against 1450ppm fluoride toothpaste as a control. Meta-analysis of three studies showed a positive effect on caries measured using quantitative light-induced fluorescence (QLF) in favour of arginine: mean difference -4.67, (95%CI, -6.34 to -3.01). The overall GRADE assessment of this was considered to be very low.

Conclusion: At present there is insufficient evidence in support of a caries-preventive effect for the inclusion of arginine in toothpastes. More rigorous studies, and studies which are less dependent on commercial interests, are required.

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Title: Developmental defects of enamel and caries in primary teeth.

Source: Evidence-Based Dentistry. 18(3):72-73, 2017 Oct 27.

Abstract

Data sources: PubMed, Web of Knowledge, Scopus and Scielo. Study selection: Two reviewers identified studies supervised by a third. Observational studies which investigated the association between developmental defects of enamel and dental caries in the primary dentition, which were assessed by clinical examination and published in English, Spanish or Portuguese. Data extraction and synthesis: Quality of research was assessed using the critical appraisal checklist from the Joanna Briggs Institute. Meta-analysis was conducted using crude and adjusted association measures (relative risk and odds ratio) with 95% confidence intervals. Combined results were presented as pooled odds ratio, and where necessary were estimated using fixed and random effect models. If heterogeneity was encountered in results, a random effect model was used. Bias was assessed using a funnel plot and the Egger test.

Results: Eighteen studies were included in the systematic review and sixteen in meta-analysis; two out of the 16 were cohort studies, the rest being cross-sectional. Twelve of the studies included were conducted in low-income countries. The Egger test showed a degree of bias in some of the studies included. The authors found children with diffuse opacities or hypoplasia had higher odds of having dental caries (OR 1.42, 95% CI; 1.15-1.76; OR 4.29% CI 2.24-8.15), however the presence of demarcated opacities did not show higher odds of caries (OR 2.62, 95% CI 0.85-8.12). Conclusions: The findings demonstrated an association between developmental defects of enamel and dental caries in the primary dentition. A preventive approach to dental caries and attention to children with enamel defects appears as a useful health promotion and public health strategy. At the individual level, clinicians should be aware that children with enamel defects could require more frequent visits to the dental office in order to reduce the risk of dental caries.

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PAPER TITLE
Use of Vital Pulp Therapies in Primary Teeth with Deep Caries Lesions.

Purpose
This manuscript presents evidence-based guidance on the use of vital pulp therapies for treatment of deep caries lesions in children. A guideline panel convened by the American Academy of Pediatric Dentistry formulated evidence-based recommendations on three vital pulp therapies: indirect pulp treatment (IPT; also known as indirect pulp cap), direct pulp cap (DPC), and pulpotomy.

Methods
The basis of the guideline's recommendations was evidence from "Primary Tooth Vital Pulp Therapy: A Systematic Review and Meta-Analysis." (Pediatr Dent 2017;15;39[1]:16-23.) A systematic search was conducted in PubMed/MEDLINE, Embase, Cochrane Central Register of Controlled Trials, and trial databases to identify randomized controlled trials and systematic reviews addressing peripheral issues of vital pulp therapies such as patient preferences of treatment and impact of cost. Quality of the evidence was assessed through the Grading of Recommendations Assessment, Development, and Evaluation approach; the evidence-to-decision framework was used to formulate a recommendation.

Results
The panel was unable to make a recommendation on superiority of any particular type of vital pulp therapy owing to lack of studies directly comparing these interventions. The panel recommends use of mineral trioxide aggregate (MTA) and formocresol in pulpotomy treatments; these are recommendations based on moderate-quality evidence at 24 months. The panel made weak recommendations regarding choice of medication in both IPT (moderate-quality evidence [24 months], low quality evidence [48 months]) and DPC (very-low-quality evidence [24 months]). Success of both treatments was independent of type of medication used. The panel also recommends use of ferric sulfate (low-quality evidence), lasers (low-quality evidence), sodium hypochlorite (very-low-quality evidence), and tricalcium silicate (very-low-quality evidence) in pulpotomies; these are weak recommendations based on low-quality evidence. The panel recommended against the use of calcium hydroxide as pulpotomy medicament in primary teeth with deep caries lesions. Conclusions and practical implications: The guideline intends to inform the clinical practices with evidence-based recommendations on vital pulp therapies in primary teeth with deep caries lesions. These recommendations are based upon the best available evidence to-date.
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RECENT REVIEWS RELATED TO DENTAL CARIES

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Title
Use of Silver Diamine Fluoride for Dental Caries Management in Children and Adolescents, Including Those with Special Health Care Needs.

Source

Abstract
BACKGROUND: This manuscript presents evidence-based guidance on the use of 38 percent silver diamine fluoride (SDF) for dental caries management in children and adolescents, including those with special health care needs. A guideline workgroup formed by the American Academy of Pediatric Dentistry developed guidance and an evidence-based recommendation regarding the application of 38 percent SDF to arrest cavitated caries lesions in primary teeth.

TYPES OF STUDIES REVIEWED: The basis of the guideline's recommendation is evidence from an existing systematic review "Clinical trials of silver diamine fluoride in arresting caries among children: A systematic review." (JDR Clin Transl Res 2016;1[3]:201-10). A systematic search was conducted in PubMed/MEDLINE, Embase, Cochrane Central Register of Controlled Trials, and gray literature databases to identify randomized controlled trials and systematic reviews reporting on the effect of silver diamine fluoride and address peripheral issues such as adverse effects and cost. The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach was used to assess the quality of the evidence and the evidence-to-decision framework was employed to formulate a recommendation.

RESULTS: The panel made a conditional recommendation regarding the use of 38 percent SDF for the arrest of cavitated caries lesions in primary teeth as part of a comprehensive caries management program. After taking into consideration the low cost of the treatment and the disease burden of caries, panel members were confident that the benefits of SDF application in the target populations outweigh its possible undesirable effects. Per GRADE, this is a conditional recommendation based on low-quality evidence. Conclusions and practical implications: The guideline intends to inform the clinical practices involving the application of 38 percent SDF to enhance dental caries management outcomes in children and adolescents, including those with special health care needs. These recommended practices are based upon the best available evidence to-date. A 38 percent SDF protocol is included in Appendix II.

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Carson SJ; Abuhaloob L; Richards D; Hector MP; Freeman R.

Title

Source
BACKGROUND: Obesity and dental caries are global public health problems which can impact in childhood and throughout the life course. In simple terms, childhood dental caries and body weight are linked via the common risk factor of diet. An association between dental caries and obesity has been described in a number of studies and reviews. However, similarly, a relationship has also been noted between low body weight and caries experience in children. This protocol will provide the framework for an umbrella review to address the following question: Does the available evidence support a relationship between dental caries experience and body weight in the child population?

METHODS: This review protocol outlines the process to carry out an umbrella systematic review which will synthesise previous reviews of childhood dental caries experience and body weight. An umbrella review methodology will be used to examine the methodological and reporting quality of existing reviews.

DISCUSSION: The final umbrella review aims to aggregate the available evidence in order to provide a summary for policymakers and to inform healthcare interventions.

SYSTEMATIC REVIEW REGISTRATION: PROSPERO CRD42016047304.
Authors
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Authors Full Name
Vanat, M.

Title
Book Review: Evidence-Based Caries Prevention.

Source

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Title
Managing Early Childhood Caries with Atraumatic Restorative Treatment and Topical Silver and Fluoride Agents. [Review]

Source

Abstract
Early childhood caries (ECC) is a significant global health problem affecting millions of preschool children worldwide. In general, preschool children from families with 20% of the lowest family incomes suffered about 80% of the ECC. Most, if not all, surveys indicated that the great majority of ECC was left untreated. Untreated caries progresses into the dental pulp, causing pain and infection. It can spread systemically, affecting a child's growth, development and general health. Fundamental caries management is based on the conventional restorative approach. Because preschool children are too young to cope with lengthy dental treatment, they often receive dental treatment under general anaesthesia from a specialist dentist. However, treatment under general anaesthesia poses a life-threatening risk to young children. Moreover, there are few dentists in rural areas, where ECC is prevalent. Hence, conventional dental care is unaffordable, inaccessible or unavailable in many communities. However, studies showed that the atraumatic restorative treatment had a very good success rate in treating dentine caries in young children. Silver diamine fluoride is considered safe and effective in arresting dentine caries in primary teeth. The aim of this paper is to review and discuss updated evidence of these alternative approaches in order to manage cavitated ECC.

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Title
Dental Flossing and Proximal Caries in the Primary Dentition: A Systematic Review.

Source
Abstract
PURPOSE: To evaluate in a systematic review whether the use of dental floss in primary teeth is associated with a reduction in incidence of proximal caries.

MATERIALS AND METHODS: Searches were performed using the following databases: PubMed MEDLINE, Web of Science, Bireme, Scopus and The Cochrane Library. Only 5 studies were eligible for inclusion. The quality assessment and bias control of the studies were carried out based on the Fowkes and Fulton Guideline. The study concept was first registered in the international prospective register of systematic reviews (PROSPERO).

RESULTS: Flossing was professionally performed in one study and self-reported (by parents or by the children) through questionnaires in all other 4 studies. In the first study, the authors concluded that daily interdental flossing resulted in a significant reduction in the incidence of proximal caries in deciduous teeth during a 20-month period. Two cross-sectional studies found that the use of interdental floss did not show any relevant association with the prevalence of caries; one study found that a higher frequency of flossing was associated with higher caries experience, and the other found an association between severe caries and the use of dental floss, independently of the flossing frequency.

CONCLUSION: There is only one study in the current literature showing evidence of an association between the use of dental floss and proximal caries reduction on primary dentition. However, the use of dental floss should never be discouraged. Healthy habits acquired in childhood continue throughout adult life, with numerous oral- and general-health benefits.

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Title: Effect of flowable composites on the clinical performance of non-curious cervical lesions: A systematic review and meta-analysis.


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Abstract
OBJECTIVES: To answer the following PICO question (participant, intervention, comparator and outcome): Does flowable resin composite restorations compared with regular resin composites improve the marginal adaptation, marginal discoloration and retention rates of restorations placed in non-curious cervical lesions [NCCLs] of adults?, through a systematic review and meta-analysis.

SOURCE: MEDLINE, Scopus, Web of Science, LILACS, BBO, Cochrane Library and SIGLE were searched without restrictions, as well as the abstracts of the IADR, clinical trials registries, dissertations and theses in May 2016 (updated in April 2017).

STUDY SELECTION: We included randomized clinical trials (RCTs) that answered the PICO question. RCTs were excluded if cavities other than NCCLs were treated; indirect restorations; polyacid-based resins instead of composite resins were employed, restorations in primary teeth and restorations were placed in carious cervical lesions. The risk of bias tool of the Cochrane Collaboration was applied in the eligible studies and the GRADE tool was used to assess the quality of the evidence.

DATA: After duplicates removal, 5137 articles were identified. After abstract and title screening, 8 studies remained. Six were at “unclear” risk of bias. The study follow-ups ranged from 1 to 3 years. No significant difference was observed between groups for loss of retention and marginal discoloration in all follow-ups. Better marginal adaptation was observed for restorations performed with flowable composites. At 1-year (risk ratio=0.27 [0.10 to 0.70]) and 3-year (risk ratio=0.34 [0.17 to 0.71]) follow-ups, flowable composites showed a risk 73% and 66% lower than regular composites for lack of adaptation, respectively. The evidence was graded as moderate quality for loss or retention at 3 years due to risk of bias and low and very low for all other outcomes due to risk of bias, imprecision and inconsistency.
CONCLUSIONS: We have moderate confidence that the resin composite viscosity does not influence the retention rates at 3 years. Similar marginal discoloration and better marginal adaptation was observed for flowable composites but the quality of evidence is doubtful. (PROSPERO CRD42015019560).

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Title
In vitro biofilm models to study dental caries: a systematic review.

Source

Abstract
The aim of this systematic review is to characterize and discuss key methodological aspects of in vitro biofilm models for caries-related research and to verify the reproducibility and dose-response of models considering the response to anti-caries and/or antimicrobial substances. Inclusion criteria were divided into Part I (PI): an in vitro biofilm model that produces a cariogenic biofilm and/or caries-like lesions and allows pH fluctuations; and Part II (PII): models showing an effect of anti-caries and/or antimicrobial substances. Within PI, 72.9% consisted of dynamic biofilm models, while 27.1% consisted of batch models. Within PII, 75.5% corresponded to dynamic models, whereas 24.5% corresponded to batch models. Respectively, 20.4 and 14.3% of the studies reported dose-response validations and reproducibility, and 32.7% were classified as having a high risk of bias. Several in vitro biofilm models are available for caries-related research; however, most models lack validation by dose-response and reproducibility experiments for each proposed protocol.

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Title
Limited Evidence Links Silver Diamine Fluoride and Caries Arrest in Children.

Source

Abstract

SOURCE OF FUNDING: Academic research funding from the General Research Fund of the Research Grants Council of Hong Kong TYPE OF STUDY/DESIGN: Systematic review and meta-analysis.

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Journal Article.
INTRODUCTION: Dental caries is known to be one of the most widespread, chronic infections affecting all ages and populations worldwide. The plethora of oral microbial population paves way for various endogenous infections and plays a crucial role in polymicrobial interactions contributing to biofilm-mediated diseases like caries and periodontal diseases.

METHODS: Extensive literature survey was conducted using the scientific databases like PubMed, Google scholar, Science Direct, etc. using the key words like dental caries, orodental infections, dental microbes, dental biofilm, secondary caries, phytotherapy, etc. The literature was analyzed thoroughly and critical review was performed.

RESULTS: The risk of development of secondary caries and residual caries further results in treatment failure. Drug resistance developed by oral microbes and further side effects pose serious hurdles in the current therapeutic strategies. The hyperactivities of various MMPs and the resulting massive ECM degradation are the challenging part in the design of effective therapeutic approaches. Anticariogenic phytotherapy is well appreciated owing to lesser side effects and versatility of their action. But appreciable outcomes regarding the phytochemical bioavailability and bioretention are still challenging. Site-specific delivery of phytoagents at the infected site may enhance the efficiency of these drugs. Accordingly emerging phytodentistry can be promising for the management of secondary and residual caries.

CONCLUSION: This article presents major cariogens and their mechanisms in initiating and aggravating dental caries. Effectiveness of phytotherapy and different mode of action of phytochemicals against cariogens are outlined. The article also raises major concerns and possibilities of phytochemical based therapeutics to be applied in the clinical arena of caries management.
Purpose: To summarise the evidence for the efficacy of oral health educational programmes provided to expectant mothers for preventing Early Childhood Caries (ECC) and to determine the most effective intervention programme.

Materials and Methods: The search strategy included clinical trials in the Cochrane Oral Health Group's Trials Register, PubMed, Science Direct, Google Scholar, LILACS and ClinicalKey (up to 26 August 2013) in English. Reference lists of identified randomised controlled trials (RCTs) and review articles were also hand searched. Studies were selected according to predefined inclusion and exclusion criteria.

Results: The search identified 392 studies, only four of which were included. Risk ratios (RR) were calculated. The quality of the evidence was assessed by the GRADE approach. Results showed statistically significant decreases in caries incidence (RR=0.18, 95% CI [from 0.06 to 0.52]) in one study. Meta-analysis could not be performed.

Conclusion: Oral health educational programmes for expectant mothers may have a positive impact in preventing ECC, although the evidence is weak.

Abstract
Recent progress in the field of molecular biology and techniques of DNA sequence analysis allowed determining the meaning of hereditary factors of many common human diseases. Studies of genetic mechanisms in the aetiology of caries encompass, primarily, 4 main groups of genes responsible for (1) the development of enamel, (2) formation and composition of saliva, (3) immunological responses, and (4) carbohydrate metabolism. The aim of this study was to present current knowledge about the influence of single nucleotide polymorphism (SNP) genetic variants on the occurrence of dental caries. PubMed/Medline, Embase, and Cochrane Library databases were searched for papers on the influence of genetic factors connected with SNP on the occurrence of dental caries in children, teenagers, and adults. Thirty original papers written in English were included in this review. Study groups ranged from 30 to 13,000 subjects. SNPs were observed in 30 genes. Results of the majority of studies confirm the participation of hereditary factors in the aetiology of caries. Three genes, AMELX, AQP5, and ESRRB, have the most promising evidence based on multiple replications and data, supporting a role of these genes in caries. The review of the literature proves that SNP is linked with the aetiology of dental caries.

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RECENT REVIEWS RELATED TO DENTAL CARIES

**Abstract**

PURPOSE: This systematic review sought to determine whether there is consistent evidence of the association between contextual social inequities and the occurrence of dental caries in adolescents.

MATERIALS AND METHODS: An electronic survey in ISI Web of Science, SCOPUS, MEDLINE, LILACS, Cochrane Library, and SciELO databases was performed, establishing a specific search strategy in each of them. Only analytical articles in which social indicators were measured at the contextual level published up to December 2015 were included. The risk of bias of studies selected was assessed from parameters suggested by MOOSE (Meta-analysis of Observational Studies in Epidemiology), classifying them in each item as adequate, partially adequate, inadequate and unclear. After evaluation, studies were classified as good (level 1), regular (level 2) or bad (level 3) quality.

RESULTS: Of the 181 articles identified, four met the inclusion and exclusion criteria, and of these, only one showed high risk of bias. Four articles showed significant association between contextual socioeconomic factors and caries. Despite the measurement of different social inequities such as social class and neighbourhood empowerment level, the articles showed significant association between contextual socioeconomic factors and caries.

CONCLUSIONS: The scientific evidence that adolescents from areas of higher social inequity are at higher risk for caries is weak, especially considering the small number of existing studies, methodological vulnerabilities and the risk of study bias.

Abstract
Xylitol is a sugar alcohol having the properties that reduce levels of mutans streptococci (MS) in the plaque and saliva. To assess the role of xylitol in preventing dental caries. Systematic review and meta-analysis developed by Cochrane cooperation were adapted. Electronic search was carried out in PubMed through the period up to 2014. Included clinical studies were done on (1) humans (2) participants include both individuals and as pairs (mother-child) (3) participants using orthodontic appliances (4) xylitol dispensed in any form (5) compare the effect of xylitol on dental caries and on other phenotype that determines the preventive effect on dental caries, such as decayed, missing, and filled (DMF/dmf) and salivary or plaque MS level. Twenty articles of the 477 articles initially identified. Among 20 studies indexed, 16 articles were accessed, systematically reviewed, and the meta-analysis was carried out. The evaluation of quality of the studies was done using risk of bias assessment tool. The quality of the studies was high risk and unclear risk for six and five trials. The meta-analysis shows a reduction in DMF/dmf with the standard mean difference (SMD) of -1.09 (95% confidence interval [95% CI] -1.34, -0.83) comparing xylitol to all controls. The effect of DMF/dmf reduction by xylitol to fluoride varnish was with the standard mean difference (SMD) of -1.87 (95% CI, -2.19, -1.54) comparing xylitol to all controls. The subgroup analysis, there was a reduction in MS...

BACKGROUND AND OBJECTIVES: The associations of breastfeeding and early childhood caries (ECC) risk have been evaluated in several epidemiological studies with conflicting results. We performed an update meta-analysis to estimate the association of feeding patterns, breastfeeding durations and ECC risk.

METHODS AND STUDY DESIGN: Studies were identified through searching Pubmed, Web of Science, and Embase from January 1990 to December 2015.

RESULTS: Thirty-five studies involving 73,401 participants aged 0-71 months were included. The overall analysis showed children ever breastfed had a reduced risk of ECC compared with those never breastfed (OR=0.77, 95% CI: 0.61-0.97, p=0.026). Subgroup analysis revealed ever breastfeeding significantly reduced ECC risk for the studies with 3-6 years old children (OR=0.70, 95% CI: 0.54-0.90, p=0.005), with sample size >500 subjects (OR=0.63, 95% CI: 0.46-0.87, p=0.004), with Newcastle-Ottawa Scale (NOS) score >=6 (OR=0.66, 95% CI: 0.46-0.94, p=0.023), published after 2010 (OR=0.50, 95% CI: 0.30-0.82, p=0.006), with adjusted OR (OR=0.40, 95% CI: 0.18-0.88, p=0.023). Exclusive breastfeeding did not significantly decrease ECC risk compared with bottle feeding (OR=0.68, 95% CI: 0.35-1.31, p=0.248). The children breastfed >=12 months significantly increased ECC risk compared with those breastfed <12 months (OR=1.86, 95% CI: 1.37-2.52, p<0.001). Whereas, children breastfed >=6 months did not significantly increase ECC risk compared with those breastfed <6 months (OR=1.13, 95% CI: 0.83-1.53, p=0.428).

CONCLUSIONS: Our analysis suggests ever breastfeeding may protect children from ECC, and breastfeeding duration >=12 months is associated with higher ECC risk. Additional large cohort studies are required to illustrate the relationship in further study.
Objective: Studies have identified risk factors for childhood obesity. The purpose of this scoping review was to develop a conceptual model to identify non-modifiable and modifiable risk factors for childhood obesity and to illustrate how these findings are relevant in developing interventions aimed at preventing obesity and dental caries in children.

Methods: The authors searched PubMed and Embase and limited the study to English-language publications. A total of 2,572 studies were identified. After de-duplication, 2,479 studies remained and were downloaded into a citation-management tool. Two authors screened the titles and abstracts for relevance. Two hundred and sixty studies remained and were retrieved for a full-text review, and 80 studies were excluded, resulting in 180 studies included in the scoping review. An inductive content analytic methods was used to organize all statistically significant obesity risk factors into seven domains, which were classified as non-modifiable or modifiable; then a conceptual model of common risk factors associated with childhood obesity and dental caries was developed.

Results: Non-modifiable obesity risk factors include biological and developmental (e.g., genes, developmental conditions, puberty), sociodemographic and household (e.g., race/ethnicity, socioeconomic status, parent education, unemployment), cultural (e.g., degree of acculturation), and community (e.g., neighborhood composition). Modifiable risk factors included behavioral (e.g.,
Early Childhood Caries: Prevalence, Risk Factors, and Prevention. [Review] 


Abstract

Early childhood caries (ECC) is major oral health problem, mainly in socially disadvantaged populations. ECC affects infants and preschool children worldwide. The prevalence of ECC differs according to the group examined, and a prevalence of up to 85% has been reported for disadvantaged groups. ECC is the presence of one or more decayed, missing, or filled primary teeth in children aged 71 months (5 years) or younger. It begins with white-spot lesions in the upper primary incisors along the margin of the gingiva. If the disease continues, caries can progress, leading to complete destruction of the crown. The main risk factors in the development of ECC can be categorized as microbiological, dietary, and environmental risk factors. Even though it is largely a preventable condition, ECC remains one of the most common childhood diseases. The major contributing factors for the high prevalence of ECC are improper feeding practices, familial socioeconomic background, lack of parental education, and lack of access to dental care. Oral health plays an important role in children to maintain the oral functions and is required for eating, speech development, and a positive self-image. The review will focus on the prevalence, risk factors, and preventive strategies and the management of ECC.

Authors

Zhang, Xiaonan; Zhang, Lei; Zhang, Yonghong; Liao, Zhao; Song, Jinlin.
Predicting trend of early childhood caries in mainland China: a combined meta-analytic and mathematical modelling approach based on epidemiological surveys.

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Title
Predicting trend of early childhood caries in mainland China: a combined meta-analytic and mathematical modelling approach based on epidemiological surveys.

Source

Abstract
Early childhood caries (ECC) is the most common chronic disease in young children. A reliable predictive model for ECC prevalence is needed in China as a decision supportive tool for planning health resources. In this study, we first established the autoregressive integrated moving average (ARIMA) model and grey predictive model (GM) based on the estimated national prevalence of ECC with meta-analysis from the published articles. The pooled data from 1988 to 2010 were used to establish the model, while the data from 2011 to 2013 were used to validate the models. The fitting and prediction accuracy of the two models were evaluated by mean absolute error (MAE) and mean absolute percentage error (MAPE). Then, we forecasted the annual prevalence from 2014 to 2018, which was 55.8%, 53.5%, 54.0%, 52.9%, 51.2% by ARIMA model and 52.8%, 52.0%, 51.2%, 50.4%, 49.6% by GM. The declining trend in ECC prevalence may be attributed to the socioeconomic developments and improved public health service in China. In conclusion, both ARIMA and GM models can be well applied to forecast and analyze the trend of ECC; the fitting and testing errors generated by the ARIMA model were lower than those obtained from GM.

This study aimed to evaluate the scientific evidence regarding the effectiveness of silver diamine fluoride (SDF) in preventing and arresting caries in the primary dentition and permanent first molars. A systematic review (SR) was performed by 2 independent reviewers using 3 electronic databases (PubMed, ScienceDirect, and Scopus). The database search employed the following key words: "topical fluorides" AND "children" AND "clinical trials"; "topical fluorides" OR "silver diamine fluoride" AND "randomized controlled trial"; "silver diamine fluoride" AND "children" OR "primary dentition" AND "tooth decay"; "silver diamine fluoride" OR "sodium fluoride varnish" AND "early childhood caries"; and "silver diamine fluoride" AND "children". Inclusion criteria were articles published in English, from 2005 to January 2016, on clinical studies using SDF as a treatment intervention to evaluate caries arrest in children with primary dentition and/or permanent first molars. Database searches provided 821 eligible publications, of which 33 met the inclusion criteria. After the abstracts were prescreened, 25 articles were dismissed based on exclusion criteria. The remaining 8 full-text articles were assessed for eligibility. Of these, 7 publications were included in the SR. These included 1 study assessing the effectiveness of SDF at different concentrations; 3 studies comparing SDF with other interventions; 2 investigations comparing SDF at different application frequencies and with other interventions; and 1 study comparing semiannual SDF applications versus a control group. The literature indicates that SDF is a preventive treatment for dental caries in community settings. At concentrations of 30% and 38%, SDF shows potential as an alternative treatment for caries arrest in the primary dentition and permanent first molars. To establish guidelines, more studies are needed to fully assess the effectiveness of SDF and to determine the appropriate application frequency.
assessment. 17 articles met the inclusion criteria and these studies were assessed independently for methodology and performance.

RESULTS: Analysis of literature revealed that basically two concentrations of fluoride varnishes have been used: 1% and 5%, with a caries preventive fraction ranges of 6.4-30% and 5-63%, respectively.

CONCLUSION: The results showed that fluoride varnishes have been used at concentrations of 1% and 5% in the prevention of ECC. The preventive fraction was influenced by the frequency of application, the duration of study and sample size. The evidence level of the studies was of moderate to limited value.
BDA LIBRARY MEDLINE SEARCH

RECENT REVIEWS RELATED TO DENTAL CARIES

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Title: Are people with an orofacial cleft at a higher risk of dental caries? A systematic review and meta-analysis.

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Abstract: Objective To establish whether children born with an orofacial cleft have a higher risk of dental caries than individuals without cleft. Design A systematic review and meta-analysis. Methods The search strategy was based on the key words 'cleft lip palate' and 'oral hygiene caries decay'. Ten databases were searched from their inception to April 2016 to identify all relevant studies. All data were extracted by two independent reviewers. The primary outcome measure was caries measured by the decayed, missing, filled surfaces/teeth index (dmfs/dmft or DMFS/DMFT). Results Twenty-four studies met the selection criteria. All of the studies were observational. Twenty-two studies were suitable for inclusion in the meta-analysis. The overall pooled mean difference in dmft was 0.63 (95% CI: 0.47 to 0.79) and in DMFT was 0.28 (95% CI: 0.22 to 0.34). Conclusion Individuals with cleft lip and/or palate have higher caries prevalence, both in the deciduous and the permanent dentitions.

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Title: Comment on the paper entitled 'Arginine and caries prevention: A systematic review'.

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Abstract: Objective To establish whether children born with an orofacial cleft have a higher risk of dental caries than individuals without cleft. Design A systematic review and meta-analysis. Methods The search strategy was based on the key words 'cleft lip palate' and 'oral hygiene caries decay'. Ten databases were searched from their inception to April 2016 to identify all relevant studies. All data were extracted by two independent reviewers. The primary outcome measure was caries measured by the decayed, missing, filled surfaces/teeth index (dmfs/dmft or DMFS/DMFT). Results Twenty-four studies met the selection criteria. All of the studies were observational. Twenty-two studies were suitable for inclusion in the meta-analysis. The overall pooled mean difference in dmft was 0.63 (95% CI: 0.47 to 0.79) and in DMFT was 0.28 (95% CI: 0.22 to 0.34). Conclusion Individuals with cleft lip and/or palate have higher caries prevalence, both in the deciduous and the permanent dentitions.
The Colgate-Palmolive Company is extremely proud of the clinical program ... addition of 1.5% arginine to fluoride toothpaste.'

For deep carious lesions, a more conservative treatment modality ("selective caries removal") has been proposed, where only the heavily contaminated dentine is removed. In this regard, effective adjuncts for cavity disinfection such as the antimicrobial photodynamic therapy (aPDT) can be valuable clinically prior to definitive restoration. Therefore, the aim of this study was to systematically assess clinical studies on the effectiveness of aPDT as a supplementary tool in the treatment of deep caries lesions. Searches were performed in four databases (PubMed, EMBASE, ISI Web of Science, ClinicalTrials.gov) from 1st January, 2011 until 21st June, 2016 for search terms relevant to the observed parameters, pathological condition, intervention and anatomic entity. The pooled information was evaluated according to PRISMA guidelines. At first, 1651 articles were recovered, of which 1249 full-text articles were evaluated, 270 articles thereof were reviewed for eligibility and finally 6 articles met all inclusion criteria. The aPDT protocols involved Methylene Blue, Toluidine Blue and aluminium-chloride-phthalocyanine as photosensitizers and diode lasers, light-emitting diodes and halogen light-sources. The data from five reports, utilizing both culture-dependent and -independent methods, disclosed significant reduction of cariogenic bacterial load after mechanical caries removal with adjunct aPDT. As these studies exhibit some methodological limitations, e.g. lack of positive controls, this systematic review can support the application of aPDT to a limited extent only in terms of reducing the microbial load in deep carious lesions before restorative treatment.
BACKGROUND: Dental caries has significant impact on children and their families and may necessitate treatment under general anaesthesia (GA). The use of oral health-related quality of life (OHRQoL) measures enables evaluation of dental treatment from a patient's perspective.

OBJECTIVE: This systematic review aimed to assess change in OHRQoL in children following treatment under GA for the management of dental caries.

METHODS: A comprehensive search was conducted to identify articles which were assessed against inclusion criteria before data extraction. Studies involving children under 16 years, having treatment for dental caries under GA, were considered eligible. Included studies were quality assessed.

RESULTS: Twenty studies were included, which demonstrated significant heterogeneity. Most studies employed a pre-test-post-test design. All but one study relied on proxy reports of OHRQoL. Only half the studies used instruments validated in the study population. Whereas all studies reported improved OHRQoL overall, some subscales showed changes which were not significant or worsened OHRQoL. The scientific quality of the studies varied considerably.

CONCLUSION: Heterogeneity of included papers limited the conclusions which could be drawn. Treatment under GA appears to result in overall improvements in proxy-reported OHRQoL; however, there is a need for further high-quality studies employing validated, child-reported measures of OHRQoL.
Bradford, Natalie K. Centre for Online Health, The University of Queensland, Brisbane, Queensland, Australia.

Title
Author's response to comment on "Accuracy of dental images for the diagnosis of dental caries and enamel defects in children and adolescents: A systematic review".

Source

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Title
Comment on "Accuracy of dental images for the diagnosis of dental caries and enamel defects in children and adolescents: A systematic review".

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Title
Developmental defects of enamel and dental caries in the primary dentition: A systematic review and meta-analysis. [Review]

Source

Abstract
OBJECTIVES: This systematic review and meta-analysis evaluated the association between developmental defects of enamel and dental caries in the deciduous dentition.

SOURCES: Electronic searches were performed in PubMed, Web of Knowledge, Scopus and Scielo for the identification of relevant studies.

STUDY SELECTION: Observational studies that examined the association between developmental defects of enamel and dental caries in the deciduous dentition were included. Additionally, meta-regression analysis was performed to explore heterogeneity among studies.

DATA: A total of 318 articles were identified in the electronic searches. Of those, 16 studies were included in the meta-analysis. Pooled estimates revealed that children with developmental defects of enamel had higher odds of having dental caries (OR 3.32; 95%CI 2.41-4.57), with high heterogeneity between studies (I² 80%). Methodological characteristic of the studies, such as where it was conducted, the examined teeth and the quality of the study explained about 30% of the variability.

Concerning type of defect, children with hypoplasia and diffuse opacities had higher odds of having dental caries (OR 4.28; 95%CI 2.24-8.15; OR1.42; 95%CI 1.15-1.76, respectively).

CONCLUSIONS: This systematic review and meta-analysis demonstrates a clear association between developmental defects of enamel and dental caries in the primary dentition.

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Title
Early childhood caries among 5- to 6-year-old children in Southeast Asia.

Source

Abstract
OBJECTIVE: The aim of this study was to examine the prevalence and experience of early childhood caries among 5- to 6-year-old children in Southeast Asia.

METHODS: A literature search was conducted of three electronic databases (PubMed, EMBASE and ISI Web of Science) to identify publications from the years 2006 to 2015. Additional hand searches of government reports and national studies were performed. Both primary and secondary data sources were included in the study. The inclusion criterion was the findings reported on the caries prevalence and/or caries experience in decayed, missing or filled tooth (dmft) or decayed, missing or filled surface...
(dmfs) scores of 5- to 6-year-old children in Southeast Asian countries. The papers retrieved were assessed by two independent reviewers, and the final decision was made by consensus.

RESULTS: The search identified 320 papers for screening; 293 were excluded and 27 full papers were retrieved and reviewed. Of those, 12 were included. Among the countries, variations were found in caries prevalence and caries experience. The caries prevalence of 5- to 6-year-old children ranged from 25% to 95%, and the caries experience (given as mean dmft score) ranged from 0.9 to 9.0. The median caries prevalence and caries experience (mean dmft score) of children 5-6 years of age were 79% and 5.1, respectively.

CONCLUSION: Based on the included studies, which are limited in quality and quantity, there is evidence that caries prevalence and experience are high amongst preschool children in Southeast Asia.
Status
In-Data-Review
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Comment on the Paper Entitled "Arginine and Caries Prevention: A Systematic Review".
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Title
Gingival recession and root caries in the ageing population: a critical evaluation of treatments.
Source
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Abstract
AIM: To review evidence for the treatments of gingival recession and root caries in older populations.

MATERIALS & METHODS: A systematic approach was adopted to identify reviews and articles to allow us to evaluate the treatments for gingival recession and root caries. Searches were performed in PubMed, Medline and Embase, the Cochrane trials register and bibliographies of European and World Workshops.

OBSERVATIONS: Gingival recession: We identified no articles that focussed specifically on older populations. Conversely, no evidence suggested that Miller class I and II lesions should be managed differently in older patients when compared to younger cohorts. Six systematic reviews included older patients and suggested that connective tissue grafts are the treatment of choice, alone or in combination with enamel matrix derivative. Root caries can be controlled at the population level by daily brushing with fluoride-containing toothpastes, whilst active decay may be inactivated using professional application of fluoride varnishes/solutions or self-applied high-fluoride toothpaste. Active root caries lesions that cannot be cleaned properly by the patient may be restored by minimally invasive techniques.

CONCLUSIONS: Gingival recession and root caries will become more prevalent as patients retain their teeth for longer. Whilst surgical (gingival recession) and non-operative approaches (root caries) currently appear to be favoured, more evidence is needed to identify the most appropriate strategies for older people.

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RECENT REVIEWS RELATED TO DENTAL CARIES

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Lingstrom, Peter. Department of Cariology, Institute of Odontology, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden.

Title
Nutrition, dental caries and periodontal disease: a narrative review.

Source

Abstract
AIM: To provide a narrative review of the role of macro- and micronutrients in relation to dental caries, gingival bleeding and destructive periodontal disease.

MATERIALS & METHODS: This review is based on systematic reviews (when available) and comparative human studies.

RESULTS: Dental caries cannot develop without the presence of dietary fermentable carbohydrates, in particular sugar. The susceptibility to develop caries in the presence of carbohydrates may be influenced by genetics and micronutrients such as vitamin D. Gingival bleeding and destructive periodontal disease are sensitive markers to both abnormalities in macronutrient content (excessive carbohydrates or poly-unsaturated fat intake, deficient protein intake) and micronutrient intake (e.g. vitamin C and B12).

CONCLUSION: Dental caries and periodontal diseases are a sensitive alarm bell for an unhealthy diet, which predicts the future onset of the diseases of civilizations.

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Title
Global epidemiology of dental caries and severe periodontitis - a comprehensive review.

Source

Abstract
BACKGROUND: Dental caries and periodontitis are the most common oral diseases and major causes of tooth loss.

AIM: To perform a review of global prevalence and incidence of dental caries and periodontitis.

METHODOLOGY: Inclusion and exclusion criteria were developed. MEDLINE database and EMBASE database were used to search for eligible publications using keywords and MeSH terms. Additionally, WHO databank was used for obtaining dental caries information and PUBMED for a search on trends of dental caries prevalence and severity.
RESULTS: Over the last four decades, the prevalence and severity of dentine carious lesions among 5- and 12-year-olds have declined; the decay-component is very high, with the lowest prevalence among 12-year-olds in high-income countries, which also had the lowest prevalence among 35- to 44-year-olds; and the number of retained teeth has increased around the globe. The prevalence of periodontitis is high, with approximately 10% of the global population affected by severe periodontitis. Study heterogeneity and methodological issues hamper comparisons across studies and over time.

CONCLUSION: While the prevalence of dental caries has decreased, the disease is prevalent in all age groups. The prevalence of periodontitis is high. There is insufficient evidence to conclude that the prevalence of periodontitis has changed over time.

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Title
Socio-behavioural aspects in the prevention and control of dental caries and periodontal diseases at an individual and population level.

Source

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Abstract
AIM: Aim was to systematically review behavioural aspects in the prevention and control of dental caries and periodontal diseases at individual and population level.

MATERIAL & METHODS: With regard to caries, MEDLINE/PubMed was searched on three subheadings focusing on early childhood, proximal and root caries. For periodontal diseases, a meta-review on systematic reviews was performed; thus, the search strategy included specific interventions to change behaviour in order to perform a meta-review on systematic reviews. After extraction of data and conclusions, the potential risk of bias was estimated and the emerging evidence was graded.

RESULTS: Regarding early childhood, proximal and root caries, 28, 6 and 0 papers, respectively, could be included, which predominantly reported on cohort studies. Regarding periodontal diseases, five systematic reviews were included. High evidence of mostly high magnitude was retrieved for behavioural interventions in early childhood caries (ECC), weak evidence for a small effect in proximal caries and an unclear effect of specific informational/motivational programmes on prevention of periodontal diseases and no evidence of root caries.

CONCLUSION: Early childhood caries can be successfully prevented by population-based preventive programmes via aiming at the change in behaviour. The effect of individual specific motivational/informational interventions has not yet been clearly demonstrated neither for the prevention of caries nor for periodontal diseases.
Abstract

Periodontal diseases and dental caries are the most common diseases of humans and the main cause of tooth loss. Both diseases can lead to nutritional compromise and negative impacts upon self-esteem and quality of life. As complex chronic diseases, they share common risk factors, such as a requirement for a pathogenic plaque biofilm, yet they exhibit distinct pathophysiologies. Multiple exposures contribute to their causal pathways, and susceptibility involves risk factors that are inherited (e.g., genetic variants), and those that are acquired (e.g. socio-economic factors, biofilm load or composition, smoking, carbohydrate intake). Identification of these factors is crucial in the prevention of both diseases as well as in their management.

AIM: To systematically appraise the scientific literature to identify potential risk factors for caries and periodontal diseases.

METHODS: One systematic review (genetic risk factors), one narrative review (role of diet and nutrition) and reference documentation for modifiable acquired risk factors common to both disease groups, formed the basis of the report.

RESULTS & CONCLUSIONS: There is moderately strong evidence for a genetic contribution to periodontal diseases and caries susceptibility, with an attributable risk estimated to be up to 50%. The genetics literature for periodontal disease is more substantial than for caries and genes associated with chronic periodontitis are the vitamin D receptor (VDR), Fc gamma receptor IIA (Fc-gammaRIIA) and Interleukin 10 (IL10) genes. For caries, genes involved in enamel formation (AMELX, AMBN, ENAM, TUF1, MMP20, and KLK4), salivary characteristics (AQP5), immune regulation and dietary preferences had the largest impact. No
common genetic variants were found. Fermentable carbohydrates (sugars and starches) were the most relevant common dietary risk factor for both diseases, but associated mechanisms differed. In caries, the fermentation process leads to acid production and the generation of biofilm components such as Glucans. In periodontitis, glycaemia drives oxidative stress and advanced glycation end-products may also trigger a hyper inflammatory state. Micronutrient deficiencies, such as for vitamin C, vitamin D or vitamin B12, may be related to the onset and progression of both diseases. Functional foods or probiotics could be helpful in caries prevention and periodontal disease management, although evidence is limited and biological mechanisms not fully elucidated. Hyposalivation, rheumatoid arthritis, smoking/tobacco use, undiagnosed or sub-optimally controlled diabetes and obesity are common acquired risk factors for both caries and periodontal diseases.

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Title
Mechanical and chemical plaque control in the simultaneous management of gingivitis and caries: a systematic review.
Source
Local Messages
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Abstract
AIM: To report the evidence on the effect of mechanical and/or chemical plaque control in the simultaneous management of gingivitis and caries.
MATERIAL AND METHODS: A protocol was designed to identify randomized (RCTs) and controlled (CCTs) clinical trials, cohort studies and prospective case series (PCS), with at least 6 months of follow-up, reporting on plaque, gingivitis and caries. Relevant information was extracted from full papers, including quality and risk of bias. Meta-analyses were performed whenever possible.
RESULTS: After the screening of 1,373 titles, 15 RCTs, 10 CCTs and 2 PCS were included. Low to moderate evidence support that combined professional and self-performed mechanical plaque control significantly reduces standardized plaque index \( [n = 4; \text{weighted mean difference (WMD)} = 1.294; 95\% \text{ CI} (0.445; 2.144); p = 0.003] \) and gingivitis scores \( [n = 4; \text{WMD} = 1.728; 95\% \text{ CI} (0.631; 2.825); p = 0.002] \). The addition of fluoride to mechanical plaque control is relevant for caries management \( [n = 5; \text{WMD} = 1.159; 95\% \text{ CI} (0.145; 2.172); p = 0.025] \) while chlorhexidine rinses are relevant for gingivitis.
CONCLUSION: Mechanical plaque control procedures are effective in reducing plaque and gingivitis. The addition of fluoride to mechanical plaque control is significant for caries management. Chlorhexidine rinse has a positive effect on gingivitis and inconclusive role in caries.

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RECENT REVIEWS RELATED TO DENTAL CARIES

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Title
Age-related changes in immune function (immune senescence) in caries and periodontal diseases: a systematic review.

Source

Abstract
AIM: To systematically review the evidence regarding immune senescence in the pathogenesis of periodontitis and dental caries.

METHODS: A systematic search of electronic databases utilizing medical subject headings (MeSH terms) supplemented by screening of review articles and other relevant texts was undertaken.

RESULTS: Seventy-three articles were included (43 for periodontitis, 30 for caries). Study results were found to be generally heterogeneous. Regarding periodontitis, human studies suggest evidence for altered neutrophil function and increased production of pro-inflammatory mediators (e.g. interleukin-1beta, interleukin-6 and prostaglandin E<sub>2</sub>) in older compared to younger subjects, and animal experiments suggest increased expression of genes that contribute to a pro-inflammatory state in older compared to younger animals. Regarding dental caries, research relating to changes in immune functioning and the impact of ageing is in its infancy. A small number of studies have reported components of innate and adaptive immunity that affect the composition of saliva and dental biofilms with possible impacts on caries progression.

CONCLUSION: There is evidence that immune functioning related to periodontitis and (less investigated) dental caries alters with increasing age. In both conditions, age-associated mechanistic changes in immune functioning are complex and incompletely understood and it is not clear how these relate to disease susceptibility.

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Title
Host genetics role in the pathogenesis of periodontal disease and caries.

Source

Abstract
BACKGROUND: This study aimed to produce the latest summary of the evidence for association of host genetic variants contributing to both periodontal diseases and caries.

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MATERIALS AND METHODS: Two systematic searches of the literature were conducted in Ovid Medline, Embase, LILACS and Cochrane Library for large candidate gene studies (CGS), systematic reviews and genome-wide association studies reporting data on host genetic variants and presence of periodontal disease and caries.

RESULTS: A total of 124 studies were included in the review (59 for the periodontitis outcome and 65 for the caries outcome), from an initial search of 15,487 titles. Gene variants associated with periodontitis were categorized based on strength of evidence and then compared with gene variants associated with caries. Several gene variants showed moderate to strong evidence of association with periodontitis, although none of them had also been associated with the caries trait.

CONCLUSIONS: Despite some potential aetiopathogenic similarities between periodontitis and caries, no genetic variants to date have clearly been associated with both diseases. Further studies or comparisons across studies with large sample size and clear phenotype definition could shed light into possible shared genetic risk factors for caries and periodontitis.

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Title
Individuals Who Brush Their Teeth Infrequently May Be at Greater Risk for New Carious Lesions.
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Abstract

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Title
Clinical Practice Guidelines Proposed the Use of Pit and Fissure Sealants to Prevent and Arrest Noncavitated Carious Lesions.
Source
Abstract

SOURCE OF FUNDING: American Dental Association and the American Academy of Pediatric Dentistry.

TYPE OF STUDY/DESIGN: Systematic review with meta-analysis of data.

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**Abstract**
Partial-caries-removal would appear to be superior to step-wise.

**Authors**
Anonymous.

**Title**
Is caries a risk factor for dental trauma? A systematic review and meta-analysis. [Review]

**Source**

**Abstract**
BACKGROUND/AIM: The association between trauma and caries is still controversial in the literature. The aim of this study was to evaluate the possible association between caries and dental trauma through a systematic review with meta-analysis.

DESIGN: A systematic literature search was performed in PubMed, Lilacs, BBO, Scopus, Web of Science, Cochrane Library, and Open Grey databases. The MeSH terms used were 'Tooth injuries', 'Tooth fractures', 'Tooth avulsion', 'Tooth movement'; 'Dental caries'; 'DMF index'; and 'Tooth demineralization'. MeSH synonyms, related terms, and free terms were included. The inclusion criteria comprised clinical investigations of subjects with and without caries that had suffered dental trauma. Quality assessment and bias control were carried out. Meta-analysis was performed using the comprehensive meta-analysis software (version 3.2). Heterogeneity was assessed using the I² index, and the odds ratio was also calculated (P < 0.05).

RESULTS: From 1290 abstracts, seven met the inclusion criteria. All studies had high methodological quality and five were included in the meta-analysis. The results demonstrated a positive association (P < 0.001) between dental trauma and dental caries in permanent teeth [OR: 1.490, 95%, CI: 1.209-1.835]. However, for children with primary teeth, the results showed a negative association (P = 0.006) between dental trauma and caries [OR: 0.706, 95%, CI: 0.550-0.906].
CONCLUSIONS: The results demonstrated positive and negative association between the presence of caries and dental trauma in permanent and primary teeth, respectively.

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Title
Systemic review of the prevention of pit and fissure caries of permanent molars by resin sealants in children in China.
Source
Abstract
AIM: The aim of the present study was to evaluate the relationship between pit and fissure sealants and the prevention of dental caries in permanent molars of children in China.
METHODS: The Cochrane Handbook for Systematic Reviews of Interventions was followed. Articles published in English and Chinese from 2002 to 2013 were selected. All these studies were randomized clinical trials related to pit and fissure sealants on caries prevention. Data were analyzed using Software Review Manager 5.1.
RESULTS: A search of the four largest Chinese medical literature databases and the PubMed/Medline database yielded a total of 397 clinical research studies about the effects of pit and fissure sealants on the prevention of dental caries; 20 original research studies were selected. In this meta-analysis, a total of 12 187 participants were included. Statistical analyses demonstrated a significant association between pit and fissure sealants and dental caries prevention for a 6-month follow-up period (combined odds ratio = 0.06, 95% CI: 0.01, 0.32, P < 0.0001). For other follow ups, there was a trend in pit and fissure sealants preventing the occurrence of dental caries.
CONCLUSION: Current clinical evidence suggests that pit and fissure sealants are effective for dental caries prevention. Sealants should be placed as part of an overall caries prevention approach. Further research with larger sample sizes and rigorously-designed clinical trials are required to corroborate the current results.

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Antimicrobial peptides (AMPs) are short cationic host-defense molecules that provide the early stage of protection against invading microbes. They also have important modulatory roles and act as a bridge between innate and acquired immunity. The types and functions of oral AMPs were reviewed and experimental reports on the use of natural AMPs and their synthetic mimics in caries and pulp infections were discussed. Natural AMPs in the oral cavity, predominantly defensins, cathelicidins and histatins, possess antimicrobial activities against oral pathogens and biofilms. Incomplete debridement of microorganisms in root canal space may precipitate an exacerbated immune response that results in periradicular bone resorption. Because of their immunomodulatory and wound healing enhancement, AMPs stimulate pro-inflammatory cytokine production, recruit host defense cells and regulate immuno-inflammatory responses in the vicinity of the pulp and periapex. Recent rapid advances in the development of synthetic AMP mimics offer exciting opportunities for new therapeutic initiatives in root canal treatment and regenerative endodontics.

STATEMENT OF SIGNIFICANCE: Identification of new therapeutic strategies to combat antibiotic-resistant pathogens and biofilm-associated infections continues to be one of the major challenges in modern medicine. Despite the presence of commercialization hurdles and scientific challenges, interests in using antimicrobial peptides as therapeutic alternatives and adjuvants to combat pathogenic biofilms have never been foreshortened. Not only do these cationic peptides possess rapid killing ability, their multi-modal mechanisms of action render them advantageous in targeting different biofilm sub-populations. These factors, together with adjunctive bioactive functions such as immunomodulation and wound healing enhancement, render AMPs or their synthetic mimics exciting candidates to be considered as adjuncts in the treatment of caries, infected pulps and root canals.
fluoride rinse were not cost-effective. In populations with more teeth and high tooth-level risk, SDF was the most effective and least costly option.

CONCLUSIONS: Root caries preventive treatments (like SDF) are effective and might even be cost-saving in high risk populations.

CLINICAL SIGNIFICANCE: Application of SDF can be recommended as a cost-saving treatment for prevention of root caries in patients with high risk of root caries.
RECENT REVIEWS RELATED TO DENTAL CARIES

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Title
Fluoride: changes in knowledge and prescription habits of paediatricians for 11 years in Brittany, France.

Source

Abstract
AIMS: To assess via a questionnaire the changes in knowledge and prescription habits for systemic fluoride of physicians at maternal and infant protection centres (MIP) and paediatricians in private practice (PPP) in the Brittany region between 2003 and 2014.

METHODS: In both 2003 and 2014, the same seven-question survey was mailed to PPP (110 in 2003 and 101 in 2014) and MIP (61 in 2003 and 71 in 2014). An eighth question was added in 2014 about French guidelines published in 2008 (AFSSAPS guidelines).

RESULTS: The overall response rate was significantly higher in 2003 (69.0%) than in 2014 (54.7%). In 2014 systemic fluoride was still considered an effective means of caries prevention (79.8% vs. 98.7% in 2003) and systematic prescription of fluoride supplements was less common (39.4 vs. 87.0% in 2003). When prescribed, systemic fluoride was given after the first 6 months of a child's life in 2014 (79.8%) instead of within the first month of life (73.5%) in 2003.

CONCLUSIONS: Paediatricians and MIP physicians in Brittany were significantly less prone to routinely prescribe systemic fluoride in 2014. Certain sources of fluoride were still not well known in 2014. Collaboration and information sharing between dentists and physicians is necessary.

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Title
A systematic review on the association between molar incisor hypomineralization and dental caries. [Review]

Source

Abstract
BACKGROUND: Molar incisor hypomineralization (MIH) is a defect of enamel. The lower strength of the enamel can lead to fractures that predispose for plaque accumulation and caries.

AIM: This systematic review aimed to assess the association between MIH and caries.
RECENT REVIEWS RELATED TO DENTAL CARIES

DESIGN: Studies involving children of all ages, which reported results on MIH and caries in the permanent dentition, were considered eligible. A search was performed in PubMed and was limited to the period from January 2003 to November 2015, and to studies written in English. Reviews, meta-analyses, and case reports were excluded. The studies were evaluated by use of the Newcastle-Ottawa Quality Assessment Scale (NOS).

RESULTS: Seventeen publications were compiled in the review. Most publications reported that children with MIH have higher caries experience. One study did not observe a difference in DMF values among children affected or not by MIH. Three studies reported that children with MIH were 2.1 to 4.6 times more likely to have caries in the permanent dentition than children without MIH.

CONCLUSIONS: A significant association between MIH and caries was found. The results should, however, be interpreted cautiously due to the lack of high-quality studies. The present systematic review confirms the need for further well-designed studies.

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Title
The innovative applications of therapeutic nanostructures in dentistry. [Review]

Source

Abstract
Nanotechnology has paved multiple ways in preventing, reversing or restoring dental caries which is one of the major health care problems. Nanotechnology aided in processing variety of nanomaterials with innovative dental applications. Some showed antimicrobial effect helping in the preventive stage. Others have remineralizing potential intercepting early lesion progression as nanosized calcium phosphate, carbonate hydroxyapatite nanocrystals, nanomorphous calcium phosphate and nanoparticulate bioactive glass particularly with provision of self-assembles protein that furnish essential role in biomimetic repair. The unique size of nanomaterials makes them fascinating carriers for dental products. Thus, it is recentlyclaimedthat fortifying the adhesives with nanomaterials that possess biological meritsdoes not only enhance the mechanical and physical properties of the adhesives, but also help to attain and maintain a durable adhesive joint and enhanced longevity. Accordingly, this review will focus on the current status and the future implications of nanotechnology in preventive and adhesive dentistry.

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Composites resins have become the first choice for direct anterior and posterior restorations. The great popularity is related to their esthetic appearance and reduced need of sound tissue removal as compared with former treatments. Several studies have demonstrated that composite restorations may last long in clinical service. In this review we discuss the factors playing a role on the long-term longevity. Composite restorations have demonstrated a good clinical performance with annual failure rates varying from 1% to 3% in posterior teeth and 1% to 5% in anterior teeth. Factors related to the patients such as caries risk and occlusal stress risk, in addition to socioeconomic factors, may affect the survival significantly. Characteristics of the clinical operators, particularly their decision making when it comes to observing or approaching an existing restoration, are decisive for longevity. Cavity features such as the number of restored walls, composite volume, and presence of endodontic treatment are of major importance and may dictate the service time of the restorative approach. The choice of restorative composite seems to have a minor effect on longevity provided that appropriate technical procedures are used. The main reasons for failure in posterior teeth are secondary caries and fracture (restoration or tooth/restoration), while in anterior teeth esthetic concerns are the main reasons leading to restoration failures. Composite resin restorations can be considered a reliable treatment as long as both the professional and the patient are aware of the factors involved in restoration failures.

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Abstract
OBJECTIVE: To assess the effect of non-flouride agents on the prevention of dental caries in primary dentition.

MATERIALS AND METHODS: Medline, Web of Science, Embase, Cochrane Library, CBM and CNKI databases were searched to identify all the relevant articles published prior to 16 December 2016. Grey literature was also searched. Randomized controlled human clinical trials in which non-flouride agents were delivered by any method were considered.

RESULTS: Of the 1,236 studies screened, 39 full articles were scrutinized and 14 selected for inclusion in the final sample. Five chemical agents, namely arginine, casein phosphopeptide-amorphous calcium phosphate (CPP-ACP), chlorhexidine, triocysan and xylitol were investigated in these included studies. The cariostatic effects of non-flouride agents in vivo were evaluated in comparison with fluoride or placebos in randomized controlled trials. There is evidence that the use of certain doses of xylitol may be effective in arresting dental caries in primary dentition. However, quantitative synthesis could not be carried out because of the clinical and methodological heterogeneity of the included studies.

CONCLUSIONS: A study at low risk of bias indicated that daily use of xylitol wipes is a useful adjunct for caries control in young children, however, this conclusion should be interpreted with caution as this study had a very limited sample size. Chlorhexidine...
and CPP-ACP may be more effective than as a placebo in managing caries in primary dentition, but their effectiveness is borderline when compared with fluoride. Arginine-containing mint confection and 0.3% triclosan varnish were found to reduce caries development in primary teeth but the evidence was at high risk of bias. High quality randomized controlled trials are needed in order to make a conclusive recommendation.

**SEARCH METHODS:** Cochrane Oral Health's Information Specialist searched: Cochrane Oral Health's Trials Register (to 3 August 2016), the Cochrane Central Register of Controlled Trials (CENTRAL) (the Cochrane Library, 2016, Issue 7), MEDLINE Ovid (1946 to 3 August 2016), and Embase Ovid (1980 to 3 August 2016). We searched ClinicalTrials.gov and the World Health Organization International Clinical Trials Registry Platform for ongoing trials to 3 August 2016. No restrictions were placed on language or date of publication.

**SELECTION CRITERIA:** Randomised controlled trials (RCTs) comparing sealants with no sealant or a different type of sealant material for preventing caries of occlusal surfaces of premolar or molar teeth in children and adolescents aged up to 20 years. Studies required at least 12 months follow-up. We excluded studies that compared componers to resins/composites.

**DATA COLLECTION AND ANALYSIS:** Two review authors independently screened search results, extracted data and assessed risk of bias of included studies. We presented outcomes for caries or no caries on occlusal surfaces of permanent molar teeth as odds ratio (OR) or risk ratio (RR). We used mean difference (MD) for mean caries increment. All measures were presented with 95% confidence intervals (CI). We conducted meta-analyses using a random-effects model for comparisons where there were more than three trials; otherwise we used the fixed-effect model. We used GRADE methods to assess evidence quality.

**MAIN RESULTS:** We included 38 trials that involved a total of 7924 children; seven trials were new for this update (1693 participants). Fifteen trials evaluated the effects of resin-based sealant versus no sealant (3620 participants in 14 studies plus 575 tooth pairs in one study); three trials with evaluated glass ionomer sealant versus no sealant (805 participants); and 24 trials evaluated one type of sealant versus another (4146 participants). Children were aged from 5 to 16 years. Trials rarely reported background exposure to fluoride of trial participants or baseline caries prevalence. Resin-based sealant versus no sealant: second-, third- and fourth-generation resin-based sealants prevented caries in first permanent molars in children aged 5 to 10 years (at 24 months follow-up: OR 0.12, 95% CI 0.08 to 0.19, 7 trials (5 published in the 1970s; 2 in the 2010s), 1548 children randomised, 1322 children evaluated; moderate-quality evidence). If we were to assume that 16% of the control tooth surfaces were decayed during 24 months of follow-up (160 carious teeth per 1000), then applying a resin-based sealant would reduce the proportion of carious surfaces to 5.2% (95% CI 3.3% to 7.3%). Similarly, assuming that 40% of control tooth surfaces were decayed (400 carious teeth per 1000), then applying a resin-based sealant would reduce the proportion of carious surfaces to 6.25% (95% CI 3.84% to 9.63%). If 70% of control tooth surfaces were decayed, there would be 19% decayed surfaces in the sealant group (95% CI 12.3% to 27.2%). This caries-preventive effect was maintained at longer follow-up but evidence quality and quantity was reduced (e.g. at 48 to 54 months of follow-up: OR 0.21, 95% CI 0.16 to 0.28, 4 trials, 482 children evaluated; RR 0.24, 95% CI 0.12 to 0.45, 203 children evaluated). Although studies were generally well conducted, we assessed blinding of outcome assessment for caries at high risk of bias for all trials (blinding of outcome assessment is not possible in sealant studies because outcome assessors can see and identify sealant). Glass ionomer sealant versus no sealant: was evaluated by three studies. Results at 24 months were inconclusive (very low-quality evidence). One sealant versus another sealant: the relative effectiveness of different types of sealants is unknown (very low-quality evidence). We included 24 trials that directly compared two different sealant materials. Comparisons varied in terms of types of sealant assessed, outcome measures chosen and duration of follow-up. Adverse events: only four trials assessed adverse events. No adverse events were reported.
AUTHORS’ CONCLUSIONS: Resin-based sealants applied on occlusal surfaces of permanent molars are effective for preventing caries in children and adolescents. Our review found moderate-quality evidence that resin-based sealants reduced caries by between 11% and 51% compared to no sealant, when measured at 24 months. Similar benefit was seen at timepoints up to 48 months; after longer follow-up, the quantity and quality of evidence was reduced. There was insufficient evidence to judge the effectiveness of glass ionomer sealant or the relative effectiveness of different types of sealants. Information on adverse effects was limited but none occurred where this was reported. Further research with long follow-up is needed.

Abstract

Dental caries is prevalent, and secondary caries causes restoration failures. This article reviews recent studies on developing a new generation of bioactive resins with anticaries properties. Extensive efforts were made to develop new antimicrobial composites, bonding agents, and other resins containing quaternary ammonium methacrylates to suppress plaque buildup and bacterial acid production. The effects of alkyl chain length and charge density and the antimicrobial mechanisms for chlorhexidine, nano-silver, quaternary ammonium methacrylates, and protein-repellent agents were discussed. Synergistic effects of contact-killing and protein-repellent properties were shown to yield the greatest biofilm-inhibition effects. The combination of antimicrobial, protein-repellent, and calcium phosphate nanoparticle remineralization was suggested to provide maximal anticaries effects. In addition, for use orally, cytotoxicity and biocompatibility were important considerations for the new bioactive materials. Furthermore, rather than kill all bacteria, it would be more desirable to modulate the oral biofilm compositions via bioactive resins to suppress cariogenic/pathogenic species and promote benign species. For widespread clinical use of the new antimicrobial and therapeutic materials, whether they would induce bacterial drug resistance needs to be determined, which requires further study. Nonetheless, the new generation of bioactive anticaries resins with therapeutic and biofilm acid-inhibiting properties has the potential to substantially benefit oral health.

Publication Type

Journal Article. Review.
Fissure sealant (FS) and fluoride varnish (FV) are effective in preventing dental caries when compared with a no intervention control. However, the relative clinical effectiveness of these interventions is uncertain. The objective of the study was to compare the clinical effectiveness of FS and FV in preventing dental caries in first permanent molars (FPMs) in 6- to 7-year-olds. The study design was a randomized clinical trial, with 2 parallel arms. The setting was a targeted-population program that used mobile dental clinics in schools located within areas of high social and economic deprivation in South Wales. A total of 1,016 children were randomized 1:1 to receive either FS or FV. Resin-based FS was applied to caries-free FPMs and maintained at 6-month intervals. FS was applied at baseline and at 6-month intervals for 3 years. The main outcome measures were the proportion of children developing caries into dentine on at least 1 FPM (odds ratio [OR] = 0.84; 95% CI, 0.59 to 1.21; P = 0.35), a nonstatistically significant difference between FS and FV treatments. The results were similar when the number of newly decayed teeth (OR = 0.86; 95% CI, 0.60 to 1.22) and tooth surfaces (OR = 0.85; 95% CI, 0.59 to 1.21) were examined. In a community oral health program, semiannual application of FV resulted in caries prevention that was not significantly different from that obtained by applying and maintaining FS after 36 months (EudraCT: 2010-023476-23; ISRCTN: ISRCTN17029222).
Abstract

Novel approaches using OMICS techniques enable a collective assessment of multiple related biological units, including genes, gene expression, proteins, and metabolites. In the past decade, next-generation sequencing (NGS) technologies were improved by longer sequence reads and the development of genome databases and user-friendly pipelines for data analysis, all accessible at lower cost. The application of OMICS has provided more depth to existing hypotheses as well as new insights in the etiology of dental caries. For example, the determination of complete bacterial microbiomes of oral samples rather than selected species, together with oral metatranscriptome and metabolome analyses, supports the viewpoint of dysbiosis of the supragingival biofilms. In addition, metabolome studies have been instrumental in disclosing the contributions of major pathways for central carbon and amino acid metabolisms to biofilm pH homeostasis. New, often noncultured, oral streptococci have been identified, and their phenotypic characterization has revealed candidates for probiotic therapy. Although findings from OMICS research have been greatly informative, problems related to study design, data quality, integration, and reproducibility still need to be addressed. Also, the emergence and continuous updates of these computationally demanding technologies require expertise in advanced bioinformatics for reliable interpretation of data. Despite the obstacles cited above, OMICS research is expected to encourage the discovery of novel caries biomarkers and the development of next-generation diagnostics and therapies for caries control. These observations apply equally to the study of other oral diseases.
Interventions for orthodontically induced white spot lesions: a systematic review and meta-analysis

Background: Although orthodontic white spot lesions (WSLs) are one of the most often and most evident adverse effects of orthodontic treatment and widely described in the literature, there is a lack of evidence-led recommendations for therapeutic interventions. A main aim of this systematic review and meta-analysis (SR/MA) was to provide a sound evidence base on treatment interventions for orthodontic WSLs from randomized trials in human patients.

Methods: An unrestricted electronic search of eight databases from inception to May 2016, involving dentists, met the inclusion criteria. There was heterogeneity in sampling frames, methods, and scales used to investigate thresholds. The studies spanned 30 y (1983-2014), and sample representativeness and response bias issues were likely to have affected the results. Studies measured what dentists said they would do rather than actually did. Studies represented 17 countries, focusing mainly on adults (n = 17) and permanent teeth (n = 24). For proximal carious lesions confined to enamel (not reaching the enamel-dentin junction), 21% (95% CI, 15%-28%) of dentists/therapists would intervene invasively. The likelihood of a restorative intervention almost doubled (risk ratio, 1.98; 95% CI, 1.68-2.33) in high caries risk patients. For proximal lesions extending up to the enamel-dentin junction, 48% (95% CI, 40%-56%) of dentists/therapists would intervene restoratively.

Results: A total of 20 unique studies and a total of 942 (42% male and 58% female) patients were included, with an average age of 16.2 years and a mean number of 8.2 WSLs (range 2.2 to 45.4) per patient. These were allocated to adjunct treatments with casein phosphopeptide-stabilized amorphous calcium phosphate creams, external tooth bleaching, low-concentration fluoride films, gels, mouthrinses or varnishes, resin infiltration, miswak chewing sticks, bioactive glass toothpaste, or to no adjunct treatment (i.e. conventional oral hygiene). The monthly use of fluoride varnish was the best supplement to i.

Objective: Aim of this systematic review was to assess the therapeutic and adverse effects of interventions to treat post-orthodontic WSLs from randomized trials in human patients.

Search methods: An unrestricted electronic search of eight databases from inception to May 2016.

Selection criteria: Randomized controlled trials assessing any interventions for post-orthodontic WSLs on human patients.

Data collection and analysis: After duplicate study selection, data extraction, and risk of bias assessment according to the Cochrane guidelines, random-effects meta-analyses of mean differences (MDs), standardized mean differences (SMDs), and odds ratios (ORs), including their 95% confidence intervals (CIs) were performed, followed by subgroup and sensitivity analyses.

Results: A total of 20 unique studies and a total of 942 (42% per cent male and 58% per cent female) patients were included, with an average age of 16.2 years and a mean number of 8.2 WSLs (range 2.2 to 45.4) per patient. These were allocated to adjunct treatment with casein phosphopeptide-stabilized amorphous calcium phosphate creams, external tooth bleaching, low- or high-concentration fluoride films, gels, mouthrinses or varnishes, resin infiltration, miswak chewing sticks, bioactive glass toothpaste, or to no adjunct treatment (i.e. conventional oral hygiene). The monthly use of fluoride varnish was the best supplement to improve WSLs in terms of lesion area (1 trial; MD = -0.80 mm2; 95% CI = -1.10, -0.50 mm2; P < 0.05; high quality) and enamel fluorescence (3 trials; SMD = -0.92; 95% CI = -1.32, -0.52; P < 0.05; high quality), followed by the use of fluoride film. WSL treatment did not provide a considerable improvement in their clinical evaluation (3 trials; OR = 0.97; 95% CI = 0.60, 1.56; P > 0.05; moderate quality), with imprecision due to small sample size being the main limitation of existing evidence.
Conclusions: Based on the existing trials, interventions for post-orthodontic WSLs, mainly fluoride varnish, seem to be effective, but further research is needed to elucidate their clinical relevance.

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Title
Management of post-orthodontic white spot lesions: an updated systematic review. [Review]
Source

Abstract
Background/objectives: The management of post-orthodontic white spot lesions is based on remineralization strategies or a minimal-invasive camouflage of the lesions.

Aim: The aim of this systematic review was to identify and assess the quality of evidence for the various clinical technologies.

Search methods: Four databases were searched for relevant literature published in English between 2011 and 31 October 2015 according to a pre-determined PICO. Only controlled clinical studies were considered. Abstract lists and the selected full-text papers were independently examined by two reviewers and any differences were solved in consensus. The Cochrane handbook and the AMSTAR tool were used for grading the risk of bias. The quality of evidence was rated according to GRADE.

Results: Out of 280 identified publications, seven studies on remineralization, micro-abrasion and resin infiltration met the inclusion criteria. Two of them were assessed with low risk of bias. No pooling of results was possible due to study heterogeneity. The quality of evidence for all technologies was graded as very low.

Limitations: Only papers published in English with more than 20 adolescents or young adults were considered. Furthermore, a follow-up period of at least 8 weeks was required. The publication bias could not be assessed due to the paucity of included trials.

Conclusions/clinical implications: There is a lack of reliable scientific evidence to support re-mineralizing or camouflaging strategies to manage post-orthodontic white spot lesions. Further well-performed controlled clinical trials with long-term follow-up are needed to establish best clinical practice.

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Dental caries is a biofilm-mediated, sugar-driven, multifactorial, dynamic disease that results in the phasic demineralization and remineralization of dental hard tissues. Caries can occur throughout life, both in primary and permanent dentitions, and can damage the tooth crown and, in later life, exposed root surfaces. The balance between pathological and protective factors influences the initiation and progression of caries. This interplay between factors underpins the classification of individuals and groups into caries risk categories, allowing an increasingly tailored approach to care. Dental caries is an unevenly distributed, preventable disease with considerable economic and quality-of-life burdens. The daily use of fluoride toothpaste is seen as the main reason for the overall decline of caries worldwide over recent decades. This Primer aims to provide a global overview of caries, acknowledging the historical era dominated by restoration of tooth decay by surgical means, but focuses on current, progressive and more holistic long-term, patient-centred, tooth-preserving preventive care.

Abstract
Dental caries is an oral pathology associated with both lifestyle and genetic factors. The caries process can be influenced by salivary composition, which includes ions and proteins. Studies have described associations between salivary protein polymorphisms and dental caries experience, while others have shown no association with salivary proteins genetic variability. The aim of this study is to assess the influence of salivary protein polymorphisms on the risk of dental caries by means of a systematic review of the current literature. An electronic search was performed in PubMed, Scopus, and Virtual Health Library. The following search terms were used: "dental caries susceptibility," "dental caries," "polymorphism, genetics," "saliva," "proteins," and "peptides." Related MeSH headings and free terms were included. The inclusion criteria comprised clinical investigations of subjects with and without caries. After application of these eligibility criteria, the selected articles were qualified by assessing their methodological quality. Initially, 338 articles were identified from the electronic databases after exclusion of duplicates. Exclusion criteria eliminated 322 articles, and 16 remained for evaluation. Eleven articles found a consistent association between salivary...
protein polymorphisms and risk of dental caries, for proteins related to antimicrobial activity (beta defensin 1 and lysozyme-like protein), pH control (carbonic anhydrase VI), and bacterial colonization/adhesion (lactotransferrin, mucin, and proline-rich protein Db). This systematic review demonstrated an association between genetic polymorphisms and risk of dental caries for most of the salivary proteins.

Abstract
The main reason cited for the replacement of dental composite restorations is the recurrence of caries. Numerous models—both in vitro, with acid gels or bacterial biofilms, and in situ, with dental appliances—have been used to study caries formation around dental composites. The literature shows that many factors may affect caries formation, including marginal gap formation, gap size, the local chemical environment, the durability of the bonded interface, the extent of bacterial penetration, and the presence of mechanical loading. Studies have also shown that what have been called wall lesions may form independent of surface lesions, though not likely due to microleakage through very small gap spaces in the clinical situation. Gap size and mechanical loading have been shown to be related to lesion severity within in vitro models, but these results do not correspond exactly with those obtained from in situ studies using restorations in dental appliances. Though not conclusive, some in vitro models have shown that certain materials possessing antimicrobial characteristics may reduce the severity of lesion formation, suggesting possible pathways for developing new composite and adhesive materials for restorations with potentially enhanced longevity.

INTRODUCTION: Dental caries, a bacterial biofilm-associated disease, is a prevalent oral health problem. It is a bacterial biofilm-associated disease. Conventional means of combating this disease involves oral hygiene, mostly tooth brushing. Supplementary means of prevention and treatment is often necessary. The use of sustained-release delivery systems, locally applied to the oral cavity appears to be one of the most acceptable avenues for the delivery of antimicrobial agents. Area covered: The development and current approaches of local sustained delivery technologies applied to the oral cavity for treatment and prevention of dental caries is discussed. The use of polymeric drug delivery systems, varnishes, liposomes and nanoparticles is presented. Expert opinion: The use of local sustained-release delivery systems applied to the oral cavity has numerous clinical, pharmacological and toxicological advantages over conventional means. Various sustained-release technologies have been suggested over the course of several years. The current research on oral diseases concentrates predominantly on improving the drug delivery. With progress in pharmaceutical technology, sophisticated controlled-release platforms are being developed. The sustained release concept is
innovative and there are few products available for the benefit of all populations. Harmonizing academic research with the dental industry will surely expedite the development and commercialization of more products of such pharmacological nature.

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Title
Part 2: Oral health care for the housebound patient. [Review]
Source
Abstract
Oral disease can have a significant impact on the health and wellbeing of the housebound patient. The aetiology of oral conditions such as dental caries and periodontal disease have been well investigated and there is a solid evidence base in how to best prevent their progress. The Department of Health document Delivering better oral health: an evidence-based toolkit for prevention is a valuable resource that outlines the current best preventative evidence in the form of practical advice for clinicians and patients. This article aims to distil and present this advice for the benefit of community nurses. It will identify areas of particular importance for people with additional needs, particularly the elderly and infirm. Outlining how to best tailor preventative advice and treatment for this patient group.

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Title
Advances in the microbial etiology and pathogenesis of early childhood caries. [Review]
Source
Abstract
Early childhood caries (ECC) is one of the most prevalent infectious diseases affecting children worldwide. ECC is an aggressive form of dental caries, which, left untreated, can result in rapid and extensive cavitation in teeth (rampant caries) that is painful and costly to treat. Furthermore, it affects mostly children from impoverished backgrounds, and so constitutes a major challenge in public health. The disease is a prime example of the consequences arising from complex, dynamic interactions between microorganisms, host, and diet, leading to the establishment of highly pathogenic (cariogenic) biofilms. To date, there are no effective methods to identify those at risk of developing ECC or to control the disease in affected children. Recent advances in deep-sequencing technologies, novel imaging methods, and (meta)proteomics-metabolomics approaches provide an unparalleled potential to reveal new insights to illuminate our current understanding about the etiology and pathogenesis of ECC based on previous and current knowledge on biofilm matrix, microbial diversity, and host-microbe interactions, which could have direct implications for developing new approaches for improved risk assessment and prevention of this devastating and costly childhood health condition.

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Title: Dental caries and quality of life of preschool children: discriminant validity of the ECOHIS. [Review]
Source: Pesquisa Odontologica Brasileira = Brazilian Oral Research. 31:e24, 2017 03 30.
Abstract: The aim of the present study was to confirm the discriminant validity (obtained using traditional statistical methods) of the Early Childhood Oral Health Impact Scale (ECOHIS) between preschool children with and without caries (mean score) through an evaluation of the effect size. A systematic search of electronic databases and a manual search were performed for studies published up to December 2015 involving the use of the ECOHIS for the evaluation of the impact of dental caries on oral health-related quality of life (OHRQoL) among preschool children. Two independent raters performed the selection of the studies and data extraction. Only papers published in English and Spanish were selected. No restrictions were imposed regarding the year of publication. Twelve studies were included, and the magnitude of standardized differences between the means of the "without caries" and "with caries" groups was calculated using Cohen's d. Most studies demonstrated a large magnitude in the difference between the groups evaluated. The estimate of the effect size confirmed the discriminant validity of the ECOHIS obtained through traditional statistics. Thus, the magnitude of the difference should be considered an important analytical tool for the confirmation of statistical findings regarding null hypotheses and demonstrates the clinical significance of these research results.
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Title: Meta-analysis of teeth from European populations before and after the 18th century reveals a shift towards increased prevalence of caries and tooth loss. [Review]
Abstract: Based on single studies, it has been hypothesised that Europeans have suffered less frequently from caries before the 18th century than after the 18th century and that females have higher caries prevalence, but systematic European-wide overviews are sparse. We collected published data on dental diseases (publication between 1981 and 2015 with reports on 29 cohorts with 4998 individuals and a total of 85817 teeth). Meta-analyses revealed that, over several hundred years, including the post-18th century era, Europeans had relatively constant frequencies of caries and ante-mortem tooth loss, but since the 18th century, the mean frequencies of these dental diseases increased (each p<0.05). Tooth loss correlated with caries and odontogenic abscesses (each p<0.05). Although the mean caries and ante-mortem tooth loss frequencies increased since the 18th century, there are overlaps...
with many pre-18th century cohorts. In addition, in contrast to previous hypotheses, no general increase of caries prevalence in females could in fact be verified. It is likely that changes in nutrition (more sugar) and dental health (possibly higher frequency of tooth extraction) could be the underlying factors which led to this minor to moderate shift of dental disease frequencies in Europe.