



Editorial

Dear distinguished colleagues,

In 2012, the World Health Organization pointed out that 60 to 90% of school children worldwide and almost 100% of adults had caries.

The high-risk groups, which deserve and require special attention and care, are clearly identified. The fact is that today, at the beginning of the 21st century, we are content to use contemporary methods for prevention, screening and conservative preservation of hard dental tissues and dental pulp.

When we were selecting articles, to provide you with what could be used as guidelines on the topic of cariology, we knew that it would be a difficult task, given the voluminous literature on the topic.

The aim of this issue of EluMed is to provide you with evidence-based, relevant, current research and practical clinical advice on the subject.

Through articles based on literature analysis, selected and summarized for you, you will be able to find current recommendations for best clinical practices.

I hope you find the material helpful and enjoy reading this issue.

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Cariology

It is very difficult to choose four articles in the field of cariology when the literature on the subject matter is so vast. The aim of the articles that we have chosen for you is to briefly describe current research on the subject. One article selected addresses early lesions and the importance of intercepting them as quickly as possible, in children and young adults, in order to preserve dental tissues. The use of fluoridated topical products plays a part in this mineralization and remineralization strategy. Another article will focus on the availability of fluorides and the benefit of adjuvants to potentiate the effect of these fluorides. Unfortunately, when there is no longer any chance of remineralization and the decay progresses, the difficult question arises of choosing between partial excavation and total excavation. The Cochrane review calls into question some of our practices, always with the aim of falling within an approach of saving tissue. Although partial excavation shows beneficial results in primary teeth and for occlusal cavities in permanent teeth, other research is currently under way to assess the long-term results, particularly in the event of class 2 restoration.

We will also look at the suitability of applying the treatment model for chronic diseases to tooth decay. This new paradigm offers us a real prospect of understanding this disease via a biopsychosocial approach. This vision is at the heart of the oral health medicine that we would like to offer our patients, from the youngest to the oldest.

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Extract from “Best clinical practice guidance for management of early caries lesions in children and young adults: an EAPD policy document”

BACKGROUND:

These best practices guidelines are offered by the European Academy of Pediatric Dentistry following the Brussels congress in May 2015.

OBJECTIVE:

To propose recommendations for best clinical practices based on a literature analysis.



Fig. 1 - Early lesions in a 16-year-old adolescent.
Application of fluoride varnish.



Fig. 2 - Early caries in a 4-year-old child.

1 WHAT IS AN EARLY LESION?

■ An early caries lesion is usually defined as a **non-cavitated lesion** (Figure 1).

In children, these lesions must be diagnosed during or just after the eruption of milk teeth. In the absence of treatment and preventive intervention, they develop into early childhood caries (Figure 2).

- In deciduous teeth, they affect the vestibular surfaces of incisors and the occlusal and proximal surfaces of primary molars.
- In permanent teeth, they generally affect the occlusal and proximal surfaces of the posterior teeth.

2 DIAGNOSING AN EARLY LESION

■ Detection is performed through:

a rigorous clinical examination, under lighting and after having dried the teeth. Use of the International Caries Detection and Assessment System (ICDAS) is recommended. Optical aids, x-rays (bite-wing) and the use of fluorescence or transillumination may help determine the diagnosis.

■ Monitoring is put in place:

- At regular intervals (6 to 12 months) depending on the individual patient's risk of caries.
- Photographs or the use of video allowing the patient's file to be completed.

3 CARIES RISK ASSESSMENT FOR THE INDIVIDUAL PATIENT (CRA)

The caries risk assessment constitutes a vital aid to treatment decisions and for determining the frequency of check-ups. It must be assessed during the first visit and regularly reassessed.

4 TREATMENT OF EARLY CARIES LESIONS?

■ **This treatment is based on the least invasive treatments possible,**

which ensures tissue is saved whilst following a therapeutic gradient (non-invasive, micro-invasive, minimally invasive treatments):

- A Education and prevention** of poor diet and oral hygiene habits
- B Parental involvement**
- C Elimination of the bacterial biofilm** twice a day using an age-appropriate fluoride toothpaste
- D Use of topical fluorides** (fluoridated mouthwashes, fluoride varnish) and remineralizing pastes
- E Filling of pits and fissures** (sealing of fissures)
- F Erosion/infiltration technique for early-stage caries lesions**
- G Production of micro cavities and use of bioactive materials**

In France, the Haute Autorité de Santé (National Health Authority) has issued recommendations on caries risk assessment². It identifies two risk levels: high and low.

The patient presents a high risk if they present at least one of the following individual risk factors:

- Failure to brush daily with fluoride toothpaste
- Regular sugar intake outside mealtimes or snacking (sugary foods, sugary drinks, sweets)
- Long-term use of medication that is sweetened or causes oligoptyalism
- Crevices on the molar teeth
- Presence of plaque that is visible to the naked eye without disclosure
- Presence of caries (affecting the dentin) and/or initial reversible lesions (affecting the enamel)

The patient presents a low risk if they do not present any of these risk factors.

² HAS. Assessment of caries risk and indications for pit and fissure sealants (first and second permanent molars) in children and in adolescents under 18. 2006. Available at www.has-sante.fr

ICDAS: International Caries Detection and Assessment System.

The ICDAS criteria were developed in 2001 and updated in 2005 (ICDAS 2). The aim is to obtain international standardized criteria in order to compare epidemiological analyses and research. For the practitioner, it is also an effective aid for correlating detection criteria, histological status and therapeutic decisions.

Focus on:

- Detection of early lesions is a priority so that they are intercepted as quickly as possible and tissue damage is limited.
- Non-invasive or micro-invasive techniques are implemented depending on the individual patient's caries risk and following the therapeutic gradient.
- The individual patient's caries risk must be regularly reassessed in order to adjust preventive and therapeutic strategies.

Extract from “Operative caries management in adults and children”

BACKGROUND:

This Systematic Review carried out by Cochrane Group researchers on oral health care.

OBJECTIVE:

To compare the benefit of partial caries removal with complete caries removal in primary and permanent teeth.

RESOURCES:

Eight randomized controlled trials provided a panel of 934 participants and 1372 teeth (4 trials on primary teeth, 3 on permanent teeth and 1 on primary and permanent teeth).

A randomized controlled trial is a study in which the selected patients are assigned randomly. One group receives the treatment to be tested. The other group receives the standard treatment or a placebo. The study lasts as long as is necessary to obtain the desired results.

1 STEPWISE EXCAVATION VERSUS COMPLETE ONE STAGE CARIES REMOVAL (4 STUDIES)

■ PRINCIPLE:

This technique allows caries to be removed progressively in two visits, several weeks apart*. The aim is to enable a tissue reaction producing a dentin bridge between the pulp cap and the base of the restoration.

■ RESULT:

Stepwise caries removal reduces the incidence of pulp exposure by 56% compared with a single complete removal procedure.

** in the article the period varies between studies, from 4 to 24 weeks. In practice, a minimum period of 6 weeks is required. Radiography allows the creation of a dentin bridge to be documented. If this dentin bridge is not created, re-intervention is postponed.*

2 PARTIAL CARIES REMOVAL VERSUS COMPLETE REMOVAL (2 STUDIES)

■ PRINCIPLE:

This technique aims to only remove part of the infected dentin (Figure 3) and cover it with a permanent sealed filling. This seal deprives the microorganisms of substrate from the oral cavity. The number of bacteria is reduced, the microbial diversity becomes less complex and the caries process stabilizes.

■ RESULT:

Partial caries excavation reduces the incidence of pulp exposure by 77% compared with complete removal (Figure 4).

3 ABSENCE OF PARTIAL CARIES REMOVAL VERSUS COMPLETE REMOVAL (2 STUDIES)

■ PRINCIPLE:

In permanent teeth, one study proposed opening the fissures and edges of the cavity. The cavity thus created is then filled with a composite resin. In primary teeth, a preformed pedodontic crown is fitted directly onto the decayed tooth, without preparation (Hall technique).

■ RESULT:

The studies were too different to enable a conclusion to be drawn. Further research is required.

The Cochrane Group is a non-profit association.

Its aim is to provide high-quality up-to-date information about the efficacy of health interventions. In particular, it produces systematic reviews. These are summaries of valid scientific data found in the literature regarding the efficacy of a specific medical intervention.



Fig. 3 - Partial caries removal in a 15-year-old patient



Fig. 4 - Complete caries removal of a deep caries lesion causing pulp exposure.

Focus on:

- Partial excavation and complete stepwise excavation reduce the risk of pulp exposure on carious, vital and asymptomatic primary and permanent teeth.
- In the case of partial excavation, there is insufficient evidence and the follow-up period was too short (1 year) to determine a difference in the risk level of pulpal symptoms and unsuccessful restoration.

Extract from “Chronic disease management strategies of early childhood caries: support from the medical and dental literature.”

BACKGROUND:

This document is a conference report.

OBJECTIVE:

To assess how chronic diseases are managed in medicine and to extrapolate the model to the management of early childhood caries.

RECAP:

Currently, tooth decay is still regularly seen as an acute pathology that principally requires technical surgical treatment. Although prevention and conservative approaches have been extensively developed, the aim is to demonstrate that this pathology is a chronic process that requires not only a conventional technical and preventive approach, but individually tailored management of etiologic factors.

1 CHRONIC DISEASE MANAGEMENT METHODS

■ The prevention and management of chronic diseases encompasses a set of coherent interventions, designed to prevent or manage one or more chronic conditions through a structured multi-disciplinary approach.

■ It requires recognition of 8 elements:

- 1- a target group
- 2- consisting of people suffering from chronic diseases
- 3- with the aim of improving the quality of results and the clinical quality
- 4- improving cost-effectiveness
- 5- through a systematic approach
- 6- based on preventive and curative interventions
- 7- in which self-management by the patient is important
- 8- and which are provided by a multi-disciplinary team of professionals.

■ Numerous techniques such as:

- motivational interviews,
- support,
- role playing,
- peer involvement,
- positive reinforcement (etc.)

are aimed at involving children and their parents in a joint process and removing obstacles to changes in behavior.

2 RECOGNIZING AND MANAGING EARLY CHILDHOOD CARIES AS A CHRONIC DISEASE

■ Early childhood caries mainly affects high-risk groups from populations in vulnerable circumstances.

Beyond biological factors, the **socio-biological model** highlights the importance of social, behavioral, educational and environmental determinants.

■ An educational approach must be combined with medical management (suitable fluoridated prescription, remineralizing topical products, etc.) and surgical management (treatment of cavitated lesions).

This education does not come down to simple information, provided as part of a conventional preventive approach. It should allow the **development of technical, social and organizational skills** in order to transform intentions to act into real behavioral changes.

3 AN INNOVATIVE AND EFFECTIVE APPROACH

■ Numerous studies have highlighted the benefit of early and repeated interventions, combining education and the implementation of fluoridated topical products. The use of new communication technologies (e.g. educational tools on tablets) also demonstrates their benefit. Conversely, few articles discuss this approach to early childhood caries as a chronic disease although there are numerous ongoing research programs. Experiments are therefore being conducted. The first results after 30 months show a reduction in the number of new caries lesions, a reduction in pain and re-interventions compared to the control group.

B.L. EDELSTEIN, NG. M.W
Pediatric dentistry V37/no. 3 May Jun 2015.

Summary* written by Dr T. **TRENTESAUX**.

*For educational purposes, the style is adapted to the review's editorial policy, with strict adherence to content.

Therapeutic patient

education aims to develop or strengthen skills and change behavior in order to make them compatible with good dental health. The ultimate objective is to improve the quality of life of our patients and those around them.

■ **The socio-economic analysis of such an approach proved positive** with an increase in preventive visits and a significant decrease in visits for treatment or extractions. The costs involved compared with the control groups are lower. This analysis should be viewed from the perspective of other models (asthma, diabetes, etc.) which have also demonstrated their efficacy and cost-effectiveness.

Plus...

• **In France, the HPST³ (Hospital, patients, health, territories) law incorporates therapeutic education and the benefit of implementing a coordinated treatment course in the Public Health Code.**

³ Law 2009-879 of July 21 2009 reforming "hospitals and relating to patients, health and territories"

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Focus on:

- **Tooth decay, recognized as a chronic pathology in high-risk groups, requires comprehensive biopsychosocial management of our young patients.**
- **This chronic disease management model reflects the development of therapeutic patient education (TPE) in France.**

Extract from “Focus on fluorides: update on the use of fluoride for the prevention of tooth decay”

C.M. CAREY
J Evid Base Dent Pract 2014;
14S: 95-102.

Summary* written by
Dr T. TRENTESAUX.

*For educational purposes, the style is adapted to the review's editorial policy, with strict adherence to content.

BACKGROUND:

The article provides an overview of the use of fluorides. In particular, it presents studies aiming to improve the dose / efficacy ratio of fluoride therapies.

This research is justified by the growing incidence of mild and very mild fluorosis.

RECAP:

Fluorides are taken in two ways:

- systemically,
- topically. Topical fluorides come from a variety of sources such as drinking water, toothpastes, mouthwashes and varnish.

1 FLUORIDES CONTAINED IN DRINKING WATER

Fluoridation of tap water is practiced in the United States. Consequently, overall consumption of fluorides by children is often higher than the optimal dose. **In France, tap water has not been fluoridated since 1985.** Depending on their consumption, everyone is encouraged to find out about the fluoride composition in some bottled water. **Highly fluoridated water is contraindicated for preparing bottles for infants and young children.**

2 RELEASE OF FLUORIDES THROUGH TOOTHPASTES

■ There are three categories of fluorides that are released from toothpaste during brushing:

- **free fluoride ions** that can react with the tooth structure, interfere with the microbial metabolism, and be absorbed by the oral mucosa
- **fluoride compounds that are released or precipitated in the oral cavity during brushing**, which release fluoride ions over time and contribute to anti-caries efficacy
- **unavailable fluoride compounds** that do not release any fluoride ions.

■ **New strategies are currently being tested** which provide for the precipitation of fluoride compounds such as calcium fluoride during brushing, resulting in longer exposure to fluorides.

One of the methods involves saturating the oral cavity with soluble calcium ions in a non-fluoride mouthwash, immediately followed by brushing with fluoride toothpaste. This strategy allows the quantity of fluorides present in the saliva one hour after brushing to be doubled compared with a toothpaste containing NaF, with the same fluoride concentration.

3 RELEASE OF FLUORIDES THROUGH MOUTHWASHES

Similar research is applied to mouthwashes. **The addition of soluble calcium salts to fluoride mouthwash multiplies the quantity of fluoride in saliva by 5** 1 hour after use of the mouthwash compared with a NaF mouthwash containing the same fluoride concentration.

4 RELEASE OF FLUORIDES THROUGH VARNISH

Application of fluoride varnish every six months in the event of high cavity risk reduces the appearance of new caries. It is now necessary to develop scientific knowledge in order to have a better understanding of

how varnishes can be effective for six months, from a single application. The main hypothesis is based on the fact that during the application, saliva bathes the varnish and dissolves the fluoride salts, allowing fluoride ions to be released from the varnish and be absorbed into the fluoride reserves in soft tissue, dental plaque and teeth. Over time, these reserves release fluoride ions again. The main cariostatic effect of fluoride varnish is probably due to the action of these fluorides on the chemical stability of the mineral part of the tooth, by transforming enamel into fluoroapatite, which is less sensitive than hydroxyapatite.

Focus on:

- Topical fluoride use reduces the individual's caries risk.

The multiplication of sources must be taken into account to limit the risk of fluorosis.

- Combining fluorides with calcium ions potentiates the efficacy of fluorides.

Opinion

Even though national oral health prevention programs and strategies have been developed, implemented and are currently in action in many countries, at the beginning of this millennium a significant number of scientific articles report no significant decrease and even an increase of tooth decay, especially among children and adolescents. This is mainly due to a set of circumstances that is unfortunately not conducive to oral health prevention – poor or incorrect oral hygiene, the dramatic change of dietary habits, the prevalence and frequent consumption of cariogenic foods and the “demonization” of fluorides.

One important factor is that not all stakeholders understand oral health and its implications in the same way and there is also the fact that oral health cannot be considered on its own; it is an important part of overall health and well-being. The socio-economic context should also be borne in mind.

The “arrest” of early caries lesions, which are clearly defined as non-cavitated lesions, has to be the main role of good dental practices in diagnosing and assessing the risk of caries, which is the basis for proper decision-making on treatment and plans (preventive techniques – remineralization solutions and topical fluorides, or micro- and minimal invasive approaches).

Usage of systemic and topical fluorides for prevention of tooth decay is evolving well, based on current bio-physical and biochemical data and is demonstrated by the growing incidence of mild and very mild fluorosis. It has been proven that the use of topical fluorides reduces the individual's risk of caries and multiple sources of intake must be taken into account to limit the risk of fluorosis. In addition, combining fluorides with calcium ions potentiates the efficacy of fluorides. An appropriate amount of fluorides in toothpastes according to age and application of fluoride gels and varnishes at an appropriate age are the proper bases of topical fluoride prevention.

Caries diagnosis is one of the most basic diagnostic skills that oral healthcare professionals must possess and yet it remains one of the most difficult skills to reliably and predictably master. Contemporary knowledge and technologies currently allow residual hard dental tissue and the pulp to be best preserved. Proper operative caries management, after a proper diagnosis, is in favor of a stepwise excavation versus one stage caries removal.

The future of reducing tooth decay is now and will continue to be a vast field of action – from new technologies for early caries detection and diagnosis to new research and new approaches to plaque biofilm, development of applicable and successful regeneration materials, development of bioactive dental materials, development of new materials for fillings, etc.

The contemporary and the best modus operandi (courses of action) for tooth decay management remain education and motivation on oral health prevention among mothers-to-be, children, adolescents and adults. For this purpose contemporary technologies have to be used adequately. Individual and group methods need to be identified and implemented. Focus on patients with special needs and chronic systemic diseases is vital. The aging population also has to be given serious consideration.

Tooth decay, as a non-communicable disease, can be dramatically decreased. Prevention, appropriate motivated behavior of the patient on their oral health, early diagnosis of the caries lesions, appropriate preventive/treatment techniques and tissue preservation are the characteristic features of the best dental practices and will lead to a better quality of life for patients.

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